U.S. Department of the Interior
Bureau of Land Management

Carson City Field Office
Carson City, Nevada

May 2005

DRAFT

EIS

Environmental Impact Statement

North Valleys Rights-of-Way Projects

Fish Springs Ranch, LLC
Intermountain Water Supply, Ltd.

MISSION STATEMENT

The Bureau of Land Management is responsible for the stewardship of our public lands. It is committed to manage, protect, and improve these lands in a manner to serve the needs of the American people for all times. Management is based upon the principles of multiple use and sustained yield of our nation's resources within a framework of environmental responsibility and scientific technology. These resources include recreation, rangelands, timber, minerals, watershed, fish and wildlife, wilderness, air and scenic, scientific and cultural values.

BLM/CC/PL-05/016+2800

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Carson City Field Office
5665 Morgan Mill Road
Carson City, Nevada 89701
http://www.nv.blm.gov

TAKE PRIDE® IN AMERICA

In Reply Refer To:
2800 (NV030)

MAY 10 2005

Dear Reader:

Enclosed for your review and comment is the North Valleys Rights-of-Way Projects Draft Environmental Impact Statement (EIS) that evaluates separate rights-of-way applications submitted by Fish Springs Ranch, LLC and Intermountain Water Supply to construct and operate water transmission pipelines across public land administered by the Bureau of Land Management, Carson City Field Office (BLM). Portions of the respective Projects would be located in whole or in part on public land administered by BLM; such operations must comply with BLM regulations for activities on public land, Title 43, Code of Federal Regulations, Part 2800, Rights-of-Way Program, and the Federal Land Policy and Management Act of 1976. Cooperating agencies for this Draft EIS include: U.S. Fish and Wildlife Service; U.S. Bureau of Indian Affairs; U.S. Geological Survey; Sierra Army Depot; Susanville Indian Rancheria; California Department of Water Resources; California Department of Fish and Game; Lassen County, California; Washoe County, Nevada; Truckee Meadows Water Authority; Truckee Meadows Regional Planning Agency; Airport Authority of Washoe County; City of Reno; and City of Sparks.

This Draft EIS details the potential effects associated with proposed construction and operation of water transmission pipelines. Although water rights, pumping rates, volume of water proposed for transfer annually to the North Valleys area, and point of use of water proposed for transport across public land is outside the jurisdiction of BLM, these issues have been included in this document. Water rights and pumping rates are under the purview of the Nevada State Engineer. Water distribution and use associated with development of the North Valleys area resulting from importation of water has been addressed by local and regional planning agencies in accordance with Nevada statutes.

The BLM is interested in your review and comment on the adequacy and accuracy of this document. Comments will be accepted during a 60-day period and public meetings will be announced via regional and local media. Comments should be sent to:

Bureau of Land Management
Carson City Field Office
Attn: Terri Knutson, EIS Project Manager
5665 Morgan Mill Road
Carson City, NV 89701
FAX: (775) 885-6147, E-mail: nvalleyswater_eis@blm.gov

A Final EIS will be prepared that will consider comments received during the 60-day comment period. The Record of Decision (ROD) will not be issued until all other permits from other agencies have been finalized and their conditions of approval will be incorporated into the ROD. For more information, please contact Terri Knutson at (775) 885-6156.

Sincerely,

Donald T. Hicks

Donald T. Hicks
Manager, Carson City Field Office

DRAFT
ENVIRONMENTAL IMPACT STATEMENT
NORTH VALLEYS RIGHTS-OF-WAY PROJECTS

LEAD AGENCY: U.S. Department of the Interior
Bureau of Land Management
Carson City Field Office

COOPERATING AGENCIES: U.S. Fish and Wildlife Service; U.S. Bureau of Indian Affairs; U.S. Geological Survey; Sierra Army Depot; Susanville Indian Rancheria; California Department of Water Resources; California Department of Fish and Game; Lassen County, California; Washoe County, Nevada; Truckee Meadows Water Authority; Truckee Meadows Regional Planning Agency; Airport Authority of Washoe County; City of Reno; and City of Sparks.

PROJECT LOCATION: Washoe County, Nevada

COMMENTS ON THIS DRAFT EIS SHOULD BE DIRECTED TO:
Ms. Terri Knutson
EIS Project Manager
Carson City Field Office
5665 Morgan Mill Road
Carson City, NV 89701
Fax: (775) 885-6147

DATE DRAFT EIS FILED WITH EPA: May 2005

DATE BY WHICH COMMENTS MUST BE POSTMARKED TO BLM: July 2005

ABSTRACT

This Draft EIS analyzes the potential impacts associated with installation of water pipelines across public land administered by BLM. Rights-of-way applications for the water transmission pipelines (Projects) were submitted by Fish Springs Ranch, LLC and Intermountain Water Supply Ltd. to the Carson City Field Office. Each company is proposing to construct and operate water supply and transmission projects to meet present and future water demands of the Stead/Silver Lake/Lemmon Valley areas (North Valleys) in Washoe County. The proposed Projects consist of installation and operation of wellheads, electrical distribution lines, electrical substation, water pipelines, pump stations, surge tanks, and a terminal water storage tank. Alternatives to the Proposed Actions are analyzed in the EIS. The Agency Preferred Alternative is Alternative A – Construct Pipelines within Common Right-of-Way.

Responsible Official for EIS

Donald T. Hicks
Manager, Carson City Field Office
Bureau of Land Management

DRAFT
ENVIRONMENTAL IMPACT STATEMENT
NORTH VALLEYS RIGHTS-OF-WAY PROJECTS

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

Page

LIST OF TABLES

TABLE OF CONTENTS (continued)

Page

LIST OF FIGURES

LIST OF APPENDICES

SUMMARY

Fish Springs Ranch LLC and Intermountain Water Supply LTD submitted separate right-of-way applications to construct and operate water transmission pipelines across public land administered by the Bureau of Land Management (BLM) Carson City Field Office. Portions of the respective Projects would be located in whole or in part on public land administered by BLM; such operations must comply with BLM regulations for activities on public land, Title 43, Code of Federal Regulations, Part 2800, Rights-of-Way Program, and the Federal Land Policy and Management Act of 1976. Due to potential for the proposed Projects to result in significant environmental impacts, BLM determined that an Environmental Impact Statement (EIS) would be necessary, as required by the National Environmental Policy Act of 1969 (NEPA). Due to similar timing, geography, and type of actions, BLM has determined that the two proposals would be analyzed in this one EIS.

This Draft EIS describes the Proposed Actions and Alternatives (including No Action Alternative), and environmental consequences that could result from implementation of these actions. Potential direct, indirect, and cumulative effects on the environment are analyzed. Impacts described in this EIS will form the basis for a BLM Record of Decision (ROD) regarding the Proposed Actions, Alternatives, and selection of appropriate mitigation measures. The ROD will not be issued until all other agency special use permits have been secured.

SUMMARY OF PROPOSED ACTIONS

Fish Springs Ranch and Intermountain Water Supply are two independent water companies proposing projects in Washoe County, Nevada generally located approximately 15 to 35 miles north of Reno, Nevada. Each company is proposing to construct and operate water supply and transmission projects to meet present and future water demands of the North Valleys Planning Area in Washoe County. The proposed Projects consist of installation and operation of wellheads, electrical distribution lines, water pipelines, pump stations, surge tanks, and a terminal water storage tank. In addition, Fish Springs Ranch's proposed Project would involve construction of an electrical substation on private land adjacent to the Alturas 345 kV transmission line in Honey Lake Valley. Intermountain Water Supply's proposed Project includes installation of wells and construction of a pump station and storage tanks on public land.

Operation, maintenance, and termination of the proposed facilities may ultimately become the responsibility of the water purveyor – Washoe County Department of Water Resources or Truckee Meadows Water Authority – after project construction is completed and system certified.

The Fish Springs Ranch proposal would convey up to 8,000 acre-feet per year (af/yr) from six wells located on Fish Springs Ranch property. The proposed pipeline would proceed south approximately 28 miles from the pump station to the terminal tank site between Lemmon Valley and Antelope Valley. The Intermountain Water Supply proposal would convey up to 3,500 af/yr from three wells (two located in Dry Valley and one in Bedell Flat). The proposed Intermountain Water Supply pipeline would parallel the Fish Springs Ranch pipeline in portions of Dry Valley, Bedell Flat, and Antelope Valley and proceed south approximately 24 miles to a terminus near Stead.

ISSUES SUMMARY

Issues identified during public scoping and agency review of the Proposed Actions include:

- Potential impacts to surface and groundwater resources from proposed pumping of groundwater in Honey Lake Valley, Dry Valley, and Bedell Flat;
- Potential direct and indirect effects to vegetation and wildlife resources from proposed groundwater extraction; and
- Cumulative effects of water importation on regional development and past, present, and future reasonably foreseeable future actions.

Water distribution and use associated with development of the North Valleys Planning Area resulting from importation of water have been addressed by local and regional planning agencies in accordance with Nevada statutes.

WATER RIGHTS AND USE

Water rights, pumping rates, volume of water proposed for transfer annually to the North Valleys Planning Area, and point of use of water proposed for transport across public land are outside the jurisdiction of BLM. Water rights and pumping rates are under the purview of the Nevada State Engineer. The State Engineer has addressed issues surrounding groundwater withdrawal from Honey Lake Valley, Dry Valley, and Bedell Flat during hearings associated with application for the respective water rights. Development of the North Valleys Planning Area associated with importation of water has been addressed by local planning agencies in accordance with Nevada statutes. Facilities, services, and development plans have been previously authorized by local governments and affected entities through adoption of the Truckee Meadows Regional Plan.

Fish Springs Ranch has groundwater rights and inter-basin transfer rights in the amount of approximately 14,000 af/yr that originated from irrigation permits issued in eastern Honey Lake Valley. Of this amount, the State Engineer has authorized inter-basin transfer of 13,000 af/yr for use in the North Valleys Planning Area. Intermountain Water Supply has secured water use and inter-basin transfer rights for 3,000 af/yr in Dry Valley. The Nevada State Engineer has approved a water right of 144 af/yr for Intermountain Water Supply in Bedell Flat. This ruling, however, is currently under appeal by Intermountain Water Supply.

PROJECT ALTERNATIVES

Issues raised during public scoping and agency review of the Proposed Actions were used to identify potential impacts that could result from the proposed Projects. Potential effects that were identified for the pipeline rights-of-way relate to short-term loss of soil and vegetation resources during the construction period.

Two alternatives to the Proposed Actions were evaluated in this Draft EIS: Alternative A - Construct Pipelines within Common Right-of-Way; and No Action Alternative. These alternatives represent a reasonable range of alternatives to the proposed North Valleys Rights-of-Way Projects.

SUMMARY OF IMPACTS

Analysis of potential impacts and mitigation associated with the proposed North Valleys Rights-of-Way Projects is presented in Chapter 4 – *Consequences of Proposed Actions and Alternatives*. The following is a summary of potential impacts, by resource, resulting from the Proposed Actions and Alternatives. Where potential impacts associated with the Proposed Actions are unique to either Fish Springs Ranch or Intermountain Water Supply's proposed Projects, the description of those impacts are distinguished. Where potential impacts are

common to both proposed Projects, no distinction is noted.

PROPOSED ACTIONS

GEOLOGY, MINERALS, AND PALEONTOLOGY

Construction and operation of water transmission pipelines as described in the Proposed Actions would not result in impacts on geology, minerals, or paleontological resources of the Projects Area. Although construction activities may result in loss or destruction of fossils, rock formations in this region of Nevada are not known for containing significant (vertebrate) paleontological resources. If rare plant, vertebrate, or invertebrate fossils are discovered during construction, BLM would be contacted to determine steps necessary to preserve the fossils. Seismic hazards could cause a rupture or failure of the pipelines or damage to related facilities but would not present a threat to public safety.

AIR RESOURCES

The Proposed Actions include the Fish Springs Ranch and Intermountain Water Supply proposals for construction of wells, water transmission pipelines, and associated components. In addition, the Fish Springs Ranch Proposed Action includes construction of an electrical substation on private land adjacent to the Alturas 345 kV transmission line. Construction activities would generate temporary emissions consisting primarily of fugitive dust (particulate matter) and gaseous engine emissions from drill rigs, construction equipment, and vehicles. Fugitive dust and gaseous emissions from the Proposed Actions would be emitted at or near ground level and would not have the potential to affect air quality or visibility in any Class I areas.

WATER RESOURCES

The Fish Springs Ranch Proposed Action would remove groundwater at the rate of 8,000 af/yr from Honey Lake Valley. The Intermountain Water Supply Proposed Action would remove 3,000 af/yr of groundwater from Dry Valley and 500 af/yr from Bedell Flat. Water from the wells would be transported in buried pipelines to the North Valleys Planning Area north of Reno/Sparks.

General types of surface water impacts that may occur include: temporary disturbance of drainages during construction of the buried water transmission pipelines; accidental releases of hydraulic fluid, fuel, or oil; and reduced stream flow where groundwater drawdown from production well pumping is connected to surface water (e.g., springs and seeps). Potential impacts to groundwater from the Proposed Actions include: temporary and localized disturbance to areas of shallow groundwater intercepted by pipeline trenching; creating a groundwater cone-of-depression around the pumping wells in each basin; lowering the groundwater table in each basin; land subsidence caused by lowering groundwater levels; and changes in salinity or total dissolved solids resulting from groundwater movement induced by the pumping wells.

Distribution and use of water from the proposed pumping wells could increase: groundwater recharge from septic systems; nitrate loading in groundwater; erosion/sedimentation from housing and business development projects; and surface water runoff due to buildings and paved areas.

SOIL RESOURCES

The Fish Springs Ranch Proposed Action would result in approximately 395 acres of surface disturbance from installation of about 38 miles of water transmission pipeline, wells, pump station, storage tanks, and an electrical

substation. The Intermountain Water Supply Proposed Action would involve about 225 acres of surface disturbance from installation of 24 miles of water transmission pipeline, wells, pump station, and storage tanks.

Portions of the pipeline routes included in the Proposed Actions would occur adjacent to previously reclaimed land associated with the Tuscarora Natural Gas Pipeline. Potential impacts to soil resources include modification to chemical and physical characteristics. These impacts are expected to be minimized, to the extent possible, following reclamation. Loss of soil and short-term interruption of natural soil processes and functions would be reversed by natural soil development over time.

VEGETATION

The Fish Springs Ranch and Intermountain Water Supply proposed Projects would have short-term direct affects to sagebrush, grassland, and juniper woodland communities during construction of the respective water transmission pipelines. Vegetation communities would be permanently removed during construction of wellheads, pumping stations, storage and surge tanks, and an electrical substation. Disturbance of existing vegetation would increase potential for noxious weeds and other invasive species to proliferate and spread to adjacent undisturbed areas.

No sensitive species or plants listed under the Endangered Species Act would be affected by the proposed Projects. Cacti protected under Nevada law would be salvaged and replanted in undisturbed habitats.

Approximately 70 non-wetland drainages would be crossed by the proposed water transmission pipelines. Assuming a construction width of 50 feet and length of 10 feet for each drainage crossing, less than 1.0 acre of non-wetlands waters of the U.S. would be affected by construction of the proposed pipelines. Short-term disturbance to the channels bed and bank would occur during construction activities.

Some jurisdictional and non-jurisdictional (isolated) wetland areas within the groundwater drawdown zone of influence could be reduced or eliminated as a result of lowered groundwater levels and/or reduced flow from springs. The magnitude of impact, if any, is difficult to quantify because of uncertainty determining water source for each spring and wetland area.

WILDLIFE RESOURCES

Direct impacts to wildlife resources resulting from the Proposed Actions would be short-term loss of habitat and displacement or loss of wildlife as a result of construction activities. Construction of permanent above-ground facilities would remove habitat and displace wildlife. Most wildlife species in the Projects Area are associated with sagebrush and grassland communities and juniper woodlands. Construction of well heads, pump stations, storage tanks, and electrical substation would result in approximately 10 acres of permanent habitat loss associated with the Fish Springs Ranch Project and 1.0 acre of habitat loss with the Intermountain Water Supply Project.

Construction of water transmission pipelines would result in temporary disturbance of approximately 395 acres of habitat for the Fish Springs Ranch Project and 225 acres for Intermountain Water Supply Project. Depending on success of reclamation, habitat disturbed by pipeline construction would have reduced capacity to support existing wildlife populations for 3 to 5 years or longer. Species dependent on sagebrush habitat could experience reduced habitat quality if sagebrush does not re-establish on reclaimed pipeline rights-of-way and other areas. Breeding and foraging habitat for sage grouse, a sensitive species, would be reduced as a result of the Projects; however, this loss would not likely affect regional populations and distribution of

sage grouse once successful reclamation has been achieved. No known historic leks would be affected.

The threatened bald eagle would not likely be affected by the proposed Projects through reduction or loss of short-term foraging opportunities in upland habitats and long-term effects due to possible reductions in wetland habitat. This change in wetland habitat, if any, would be a result of lowered groundwater levels and/or reduced flow from springs and flowing wells resulting from proposed production well pumping. The Fish Springs Ranch proposed pumping could reduce natural groundwater flow to Pyramid Lake from Smoke Creek Desert and eastern Honey Lake Valley (via Astor and Sand Passes). The estimated potential reduction is equivalent to 0.04 percent of average annual flow into Pyramid Lake from the Truckee River. The potential reduction in groundwater recharge to Pyramid Lake would not affect Lahontan cutthroat trout and cui-ui. There would be no effect on surface flow to Pyramid Lake in the Truckee River, which is the major component of source water to the lake.

The endangered Carson wandering skipper would not be directly affected by habitat removal from pipeline construction activity and permanent facilities (no loss of habitat would occur). Reduction in flow from springs or flowing wells resulting from groundwater withdrawal may affect the Carson wandering skipper through loss of habitat.

Potential habitat loss for the bald eagle is expected to be minor in a regional context due to other springs and wetlands in the area that have little or no potential of being affected by groundwater withdrawal from the Proposed Actions.

ACCESS AND LAND USE

Access

Implementation of the Proposed Actions would have short-term impacts to access routes in the North Valleys Planning Area ranging from minor traffic delays to increased traffic associated with transporting materials, equipment, and personnel to construction sites.

Land Use

The Proposed Actions would result in approximately 620 acres of surface disturbance of which 358 acres would occur on public land (225 Fish Springs Ranch/133 acres Intermountain Water Supply). Fish Springs Ranch Project would disturb approximately170 acres of private land and Intermountain Water Supply Project 92 acres of private land. While land ownership would remain unchanged, grazing and public use of the areas may experience short-term disruption during construction. Following reclamation, disturbed areas would be returned to previous uses. Grazing allotments or stocking rates would not be affected by the Proposed Actions.

RECREATION

Under the Proposed Actions, recreational users of public land in the North Valleys Planning Area would potentially be required to find other locations for specific activities and events or event staging areas if such activities conflict with construction operations.

NOISE

Major sources of noise associated with the Proposed Actions would be from construction related equipment and is predicted to be less than the maximum allowed by Washoe County Code. Noise generated by increased truck traffic transporting materials and equipment would increase along access routes to the Projects Area, but would be of short duration.

Construction noise levels would be short-term, brief, and intermittent. Long-term noise levels associated with the wellheads, pump station, and pipeline operations would generally be steady and continuous, and predicted to be at lower levels than construction noise.

VISUAL RESOURCES

Color and texture of reclaimed areas would result in minimal contrast to the existing landscape. Disturbed soil associated with pipeline construction is not expected to contrast with the undisturbed soil color. Reclamation activities would include shaping edges of disturbance areas to blend in with surrounding land forms and undisturbed vegetation. VRM objectives would be met by the proposed reclamation. New structures associated with pump stations and storage tanks would introduce moderate visual impacts of geometric shapes into a landscape of rolling hills.

SOCIAL AND ECONOMIC RESOURCES

The Proposed Actions would affect social and economic resources by increasing the level of economic activity in Washoe County during construction of the Projects. These effects are expected to be beneficial because the Proposed Actions would increase spending and income levels in the area by providing jobs. The Proposed Actions would deliver water to the North Valleys Planning Area, thereby allowing development of approved land uses which have not been allowed to develop because of the lack of a municipal water supply.

CULTURAL RESOURCES

Two National Register eligible properties are present in areas common to the Proposed Actions. Both properties were treated during the Tuscarora Pipeline Project and no further action would be required at these properties in advance of either Proposed Action. Previously unevaluated sites are not present in the area of potential effect (APE) common to both Proposed Actions.

Seven National Register eligible properties are located within the APE unique to the Fish Springs Ranch Proposed Action. These sites have been recommended as eligible based on Criterion D. Treatment on four of the sites was limited to selected features or loci within the immediate Tuscarora Project right-of-way. Additional data recovery may be required at these properties in advance of the Fish Springs Ranch Proposed Action.

Six sites located within portions of the APE unique to the Fish Springs Ranch Proposed Action remain unevaluated or contain an unevaluated component. These sites would require additional review to determine eligibility for the National Register.

Two National Register eligible properties (based on Criterion D) are located within the APE unique to the Intermountain Water Supply Proposed Action. Four sites located within portions of the APE unique to the Intermountain Water Supply Proposed Action remain unevaluated or contain an unevaluated component. These sites would require additional review to determine eligibility for the National Register prior to construction activities.

NATIVE AMERICAN RELIGIOUS CONCERNS/INDIAN TRUST RESPONSIBILITIES

No concerns regarding Native American traditional or religious uses of areas within the Fish Springs Ranch and Intermountain Water Supply Proposed Actions have been identified at this time. Based on these preliminary findings, the Proposed Actions would not appear to have a direct or indirect impact on traditional or religious values located within the common areas, areas unique to the respective Proposed Actions, tribal trust resources, trust assets, or

tribal health and safety. The ongoing consultation process may result in identification of Native American Religious Concerns/Indian Trust Responsibilities, which will be reviewed and considered during preparation of the Final EIS and ROD.

ENVIRONMENTAL JUSTICE

Potential impacts associated with the Proposed Actions would not have a disproportionate effect on minority populations. One low-income population has been identified in or near the Projects Area and would not receive a disproportionate impact from implementation of the Proposed Actions.

ALTERNATIVES

ALTERNATIVE A - CONSTRUCT PIPELINES WITHIN COMMON RIGHT-OF-WAY

Alternative A would provide a common 100-foot-wide construction right-of-way from the point of intersection of the Intermountain Water Supply pipeline and Fish Springs Ranch pipeline in Dry Valley to a point in Antelope Valley where each pipeline diverges to the respective terminus sites. Within the east-central portion of Bedell Flat, the pipelines also diverge and would not share a common right-of-way. Total linear distance shared by the proposed Intermountain Water Supply pipeline corridor and Fish Springs Ranch corridor is about 13 miles (2 miles in Dry Valley, 6 miles in Bedell Flat, and 5 miles in Antelope Valley).

A common permanent 60-foot-wide right-of-way with single access road would be issued to the respective proponents (i.e., each pipeline would be located within a common 60-foot wide right-of-way). Use of a common right-of-way would reduce surface disturbance by about 28 acres.

NO ACTION ALTERNATIVE

Under the No Action Alternative, the Proposed Actions would not be approved. Fish Springs Ranch and Intermountain Water Supply would not be authorized to develop rights-of-ways across public land. Potential impacts predicted to result from development of the Projects would not be realized. The No Action Alternative, however, would not preclude Fish Springs Ranch and/or Intermountain Water Supply from pumping groundwater for beneficial use in the basins (Honey Lake Valley, Dry Valley, and Bedell Flat) based on previously approved water rights.

AGENCY PREFERRED ALTERNATIVE

The Agency Preferred Alternative is Alternative A – Construct Pipelines within Common Right-of-Way.

CHAPTER I

INTRODUCTION

The United States Department of the Interior (USDI) Bureau of Land Management (BLM) Carson City Field Office received separate rights-of-way applications from Fish Springs Ranch, LLC and Intermountain Water Supply LTD to construct and operate water transmission pipelines across public land administered by BLM (Proposed Actions or Projects). Fish Springs Ranch and Intermountain Water Supply are two independent companies proposing projects in Washoe County, Nevada generally located approximately 15 to 35 miles north of Reno, Nevada (**Figure I-I**). Each company is proposing to construct and operate water supply and transmission projects to meet present and future water demands of the North Valleys Planning Area in Washoe County. The Proposed Actions consist of installation and operation of wellheads, electrical transmission lines, water transmission pipelines, pump stations, and surge tanks. In addition, Fish Springs Ranch's proposed Project would involve construction of an electrical substation on private land adjacent to the Alturas 345 kilovolt (kV) distribution line and a terminal storage tank on public land. Intermountain Water Supply's proposed Project includes installation of wells, construction of a pump station and storage tanks on public land, and would initially rely on diesel powered generators for electrical power.

Operation, maintenance, and termination of the proposed facilities may ultimately become the responsibility of the water purveyor; Washoe County Department of Water Resources or Truckee Meadows Water Authority, after Project construction is completed and system certified.

The Fish Springs Ranch proposal would convey up to 8,000 acre-feet per year (af/yr) from six wells located on Fish Springs Ranch property. The proposed water transmission pipeline would proceed south approximately 28 miles from the pump station to the terminal tank site between Lemmon Valley and Antelope Valley. The Intermountain Water Supply proposal would convey up to 3,500 af/yr from three wells (two wells located in Dry Valley totaling 3,000 af/yr, and one well in Bedell Flat for 500 af/yr). The proposed Intermountain Water Supply pipeline would parallel the Fish Springs Ranch pipeline in Bedell Flat and proceed south approximately 24 miles to a terminus near Stead.

Portions of the respective Projects would be located in whole or in part on public land administered by BLM; such operations must comply with BLM regulations for activities on public land, Title 43, Code of Federal Regulations, Part 2800, Rights-of-Way Program, and the Federal Land Policy and Management Act of 1976. Due to potential for the proposed Projects to result in significant environmental impacts, BLM determined that an Environmental Impact Statement (EIS) would be necessary, as

required by the National Environmental Policy Act of 1969 (NEPA). Due to similar timing, geography, and type of actions, BLM has determined that the two proposals would be analyzed in one EIS.

BLM is the lead agency in preparing this EIS for the proposed operations, with the following cooperating agencies:

- U.S. Fish and Wildlife Service
- U.S. Bureau of Indian Affairs
- U.S. Geological Survey
- Sierra Army Depot
- Susanville Indian Ranchera
- California Department of Water Resources
- California Department of Fish and Game
- Lassen County, California
- Washoe County, Nevada
- Truckee Meadows Water Authority
- Truckee Meadows Regional Planning Agency
- Airport Authority of Washoe County
- City of Reno
- City of Sparks

This document follows regulations promulgated by the Council on Environmental Quality (CEQ) for implementing procedural provisions of NEPA (40 CFR 1500-1508) and BLM's NEPA Handbook (H-1790-1).

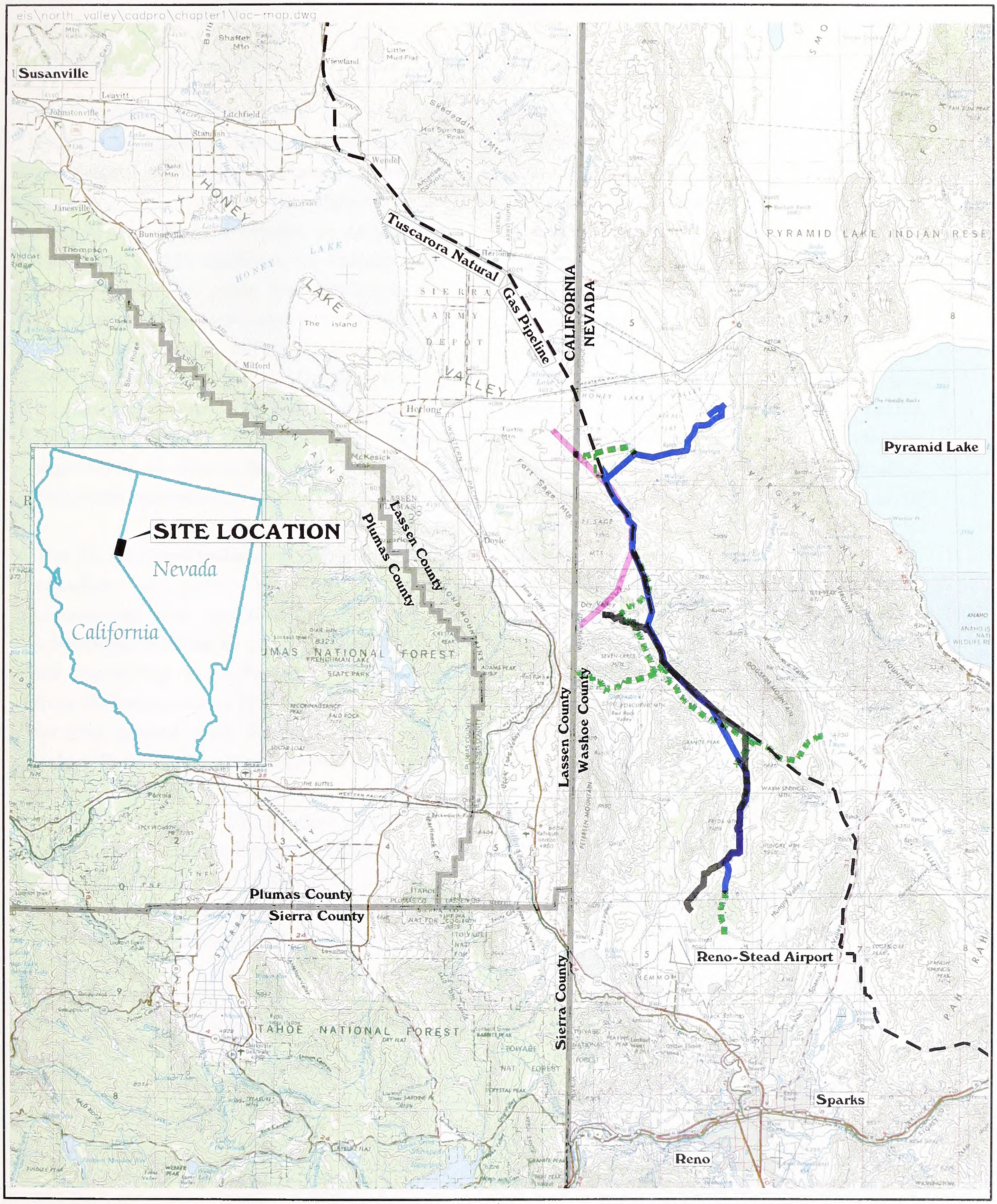
This EIS describes components of, reasonable alternatives to, and potential impacts to environmental resources from proposed construction and operation of water transmission pipelines and associated components. Chapter 1 describes the purpose of and need for the Proposed Actions, role of BLM, and public participation in the EIS process. Chapter 2 provides a historical perspective of water projects in the North Valleys Planning Area, description of the Proposed Actions, and alternatives to the Proposed Actions. Chapter 3 describes the existing environment in the Projects Area. Chapter 4 details potential direct, indirect, and cumulative effects associated with the Proposed Actions and Alternatives, and possible mitigation measures that may be selected to reduce or eliminate impacts. Chapter 5 identifies consultation and coordination with state and federal agencies that occurred during preparation of this EIS and a list of preparers. Chapter 6 contains a list of references cited in developing the EIS.

PURPOSE OF AND NEED FOR ACTION

The purpose of the two proposed Projects is to install water transmission pipelines and associated pipeline components. Installation of the water pipelines across public land administered by BLM would allow Fish Springs Ranch and Intermountain Water Supply to convey groundwater from sources for which they control water rights to a terminal tank located in the North Valleys Planning Area. The need for the Proposed Actions is to provide water to meet current and future domestic and industrial demand in the North Valleys Planning Area in accordance with the master plans of Washoe County and the City of Reno, which are in conformance with the Truckee Meadows Regional Plan.

AUTHORIZING ACTIONS

Application for rights-of-way across public land submitted to BLM may be approved only after an environmental analysis is completed.



Base Map From Sure!MAPS Raster California and Nevada 1:100,000

N

0 Miles 8

- Proposed Intermountain Water Supply Waterline
- Proposed Fish Springs Ranch Waterline
- Proposed Access Routes
- Tuscarora Natural Gas Pipeline
- Alturas Powerline

Projects Location Map
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 1-1

BLM decision options include approving the Projects as submitted, approving alternatives to the Projects to mitigate environmental impacts, approving the Projects with stipulations to mitigate environmental impacts, or denying the Projects. If BLM approves the Projects only those activities on public land detailed in the Projects would be authorized to occur. If BLM denies the Project(s), the applicant can modify and resubmit the Plan of Development to address decisions made by BLM on the original Project(s) regarding unnecessary or undue degradation of federal land and provide for reasonable reclamation.

This EIS document evaluates potential impacts to resources on public land resulting from construction and operation of two water transmission pipelines to convey 8,000 af/yr from the Fish Springs Ranch Project and 3,500 af/yr from the Intermountain Water Supply Project to terminal pipeline areas located in the North Valleys Planning Area. Mitigation and monitoring measures developed by BLM and cooperating agencies during the EIS process to address potential impacts of the Projects on groundwater and surface water features would be submitted to the Nevada State Engineer for inclusion in a monitoring/mitigation plan.

The Endangered Species Act (ESA) was amended in 1982 to allow the taking of listed species incidentally to an otherwise lawful activity by non-federal entities (Federal Register Vol. 64, No. 45, 1999). Non-federal property owners, such as private landowners, corporations, or state or local governments, wishing to conduct activities on their land that might result in the incidental take of a listed species must first obtain an incidental take permit from the U.S. Fish and Wildlife Service (Section 10(a)(1)(B)). To obtain a permit, the applicant must develop a Habitat Conservation Plan (HCP), designed to offset any harmful effects the proposed activity might have on the species. Incidental Take is defined in the Endangered Species Act as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect any threatened or endangered species. Harm may include significant habitat modification where it actually kills or injures a listed species through impairment of essential behavior l(e.g., nesting or reproduction).

Other federal, state, and local agencies have jurisdiction (including inspection responsibilities) over certain aspects of the Proposed Actions. **Table 1-1** is a comprehensive listing of the agencies and their respective permit/authorizing responsibilities.

TABLE I-I Regulatory Responsibilities	
Authorizing Action	**Regulatory Agency**
National Environmental Policy Act	BLM
Plan of Development and Rights-of-Way National Historic Preservation Act	BLM BLM; Nevada State Historic Preservation Office (SHPO)
Native American Graves Protection & Repatriation Act	BLM
American Indian Religious Freedom Act	BLM
Endangered Species Act of 1973	U.S. Fish & Wildlife Service (USFWS)
Water Appropriation Permits	Nevada State Engineer
Review Project of Regional Significance for conformance with Regional Plan	Truckee Meadows Regional Planning Commission
Review Project for conformance with Regional Water Management Plan	Regional Water Planning Commission
Utilities Environmental Protection Act	Public Utility Commission of Nevada
Air Quality Permit	Washoe County District Health, Air Quality Management
Building Permits	Washoe County Planning Department
Section 404 of the Clean Water Act	U.S. Army Corps of Engineers
Special Use Permit	City of Reno; City of Sparks; Washoe County Planning Commission as applicable

RELATIONSHIP TO BLM AND NON-BLM POLICIES, PLANS, AND PROGRAMS

BLM policies, plans, and programs for rights-of-way in the Field Office are outlined in the Carson City Consolidated Resource Management Plan (CRMP) (BLM 2001a). The CRMP does not restrict rights-of-way for underground pipelines to designated corridors. BLM requires rights-of-way contain terms and conditions to minimize damage to scenic and aesthetic values, protect fish and wildlife habitat, protect the environment, and assure compliance with applicable air and water quality standards.

WATER RIGHTS

Water rights, pumping rates, volumes of water proposed for transfer annually to the North Valleys Planning Area, and points of water use proposed for transport across public land are outside the jurisdiction of BLM. Water rights and pumping rates are under purview of the Nevada State Engineer. The State Engineer has addressed issues surrounding groundwater withdrawal from Honey Lake Valley and Dry Valley during hearings associated with application for the respective water rights. Development of the North Valleys Planning Area associated with importation of water has been addressed by local planning agencies in accordance with Nevada

statutes. Facilities, services, and land use plans have been previously approved under local government master plans, which must conform to the Truckee Meadows Regional Plan.

Fish Springs Ranch has groundwater rights in the amount of 14,108 af/yr that originated from irrigation permits issued in the Honey Lake Valley groundwater basin. The State Engineer issued a ruling on applications to change Fish Springs Ranch water rights allowing transfer of a portion of existing agricultural use water rights to municipal use in the North Valleys with the following conditions:

- Total combined duty shall be limited to 13,000 af/yr; of this total 8,000 af/yr are included in the Fish Springs Ranch Proposed Action;
- Monitoring plan shall be submitted to the State Engineer for approval and used to evaluate impacts resulting from development of groundwater;
- Totalizing meters must be installed to record pumped water volumes; and
- Water quality standards shall not be violated.

Intermountain Water Supply has secured water use and inter-basin transfer rights for 3,000 af/yr in Dry Valley included in the Proposed Action for Dry Valley. Intermountain Water Supply's Proposed Action for Bedell Flat is to pump 500 af/yr. To date, the Nevada State Engineer has approved a water right of 144 af/yr for Intermountain Water Supply in Bedell Flat. This ruling, however, is currently under appeal by Intermountain Water Supply.

REGIONAL PLANNING

The Truckee Meadows Regional Planning Agency (TMRPA) was organized in 1989 under Nevada Revised Statute (NRS) 278.026 – 278.029 to develop and maintain a comprehensive Regional Plan for the jurisdictions of Reno, Sparks, and Washoe County. The Regional Plan is a cooperative effort of local and regional units of government, major service providers, and the citizens of Truckee Meadows. The Regional Plan is structured around planning principles to provide direction and standards for:

- How and where development occurs;
- Management of natural resources;
- Coordination of public facilities and services; and
- Implementation framework for the plan.

The Plan represents a regional consensus reached through a process of public dialog and decision-making to provide a unifying framework for local and regional policies and services. Units of local government maintain separate Master Plans, in conformance with the Regional Plan (NRS 278.0282).

Interim Water Policies and Criteria developed by the Regional Water Planning Commission (RWPC) contain a key policy whereby land use or zoning designations do not guarantee allocation of future water resources. This applies to surface and groundwater, including groundwater for domestic wells. While a potential water supply deficiency may exist based

on approved land uses, water supply commitments may only be approved in accordance with the Regional Water Management Plan (RWMP). The RWPC recognizes that proposed projects, master plan, zoning or land use changes may create a situation where there are insufficient water resources identified to supply the build-out of all approved land uses within the Truckee Meadows Service Area (Washoe County RWPC 2005).

Master Plans of Local Governments and Affected Entities have identified areas of growth in the North Valleys Planning Area, which are consistent with the Regional Plan. In order for development to occur in these areas, existing water rights outside the North Valleys Planning Area may have to be purchased, converted to urban uses, and imported into the area (Ziegler 2005).

The State Engineer has designated all groundwater basins in the vicinity of Truckee Meadows as being in need of additional administration. According to the RWMP, municipal and domestic pumping in Lemmon Valley hydrobasin is nearing the estimated perennial yield and a long-term strategy to maintain the sustainability of groundwater resources is needed. In order to serve existing undeveloped approved land uses or future land use changes in Lemmon Valley, additional water resources must be imported to the basin (Washoe County RWPC 1997).

In September 2003, the Board of County Commissioners of Washoe County, Nevada adopted the amended North Valleys Planning Area Plan, as a part of the Washoe County Comprehensive Plan. The North Valleys Planning Area Plan serves as a guide for the Board of County Commissioners, Washoe County Planning Commission, and the community on matters of growth and development within the North Valleys Planning Area. Population is projected to grow at an annual rate of 1.0 percent in the North Valleys Planning Area (Washoe County Department of Community Development 2003). As growth continues to occur, demand for public services and facilities will increase.

Because all groundwater in the North Valleys Planning Area has been appropriated, Washoe County has imposed a policy that requires adequate water rights as a condition of approval of any subdivision in the Planning Area. The Planning Area covers approximately 245 square miles, but excludes the City of Reno in the Stead area. Implementation of the Proposed Actions would accommodate projected population growth and development in the North Valleys Planning Area for an undetermined time period.

Public services, facilities policies, and action programs specific to the North Valleys Planning Area are identified in the Comprehensive Plan – North Valleys Area Plan (Washoe County Department of Community Development 2003). North Valleys land use plans identify over 150,000 acres of rural and suburban land for residential, commercial, and industrial development with specific density criteria. Approximately 78,000 acres (of the total) would be available for open space, public parks, and recreation facilities.

Area and specific plans for Cultural and Scenic Resources (archaeological resources, historic places, and scenic areas), Land Resources (soil,

vegetation, wildlife, farmland, geologic, and fire hazards), Water Resources (wetlands and flood hazards), Land Use and Transportation (residential, commercial, industrial, parks and recreation, roads, and railroads) and Public Services and Facilities (water systems, wastewater treatment facilities, fire protection, police, libraries, and schools) also have been developed as part of the Washoe County Comprehensive Plan to address projected growth in the area.

PUBLIC SCOPING

To allow for an early and open process for determining the scope and significance of issues related to the Proposed Action (40 CFR 1510.7), a public scoping period was provided by BLM. A Notice of Intent to prepare the EIS was published in the Federal Register on September 15, 2003 (NV-030-5700-ER; N-76800, N-76897, Volume 68, Number 178, page 54000-54001). Publication of this notice in the Federal Register initiated a 30-day public scoping period for the Proposed Actions that provided for acceptance of comments through January 31, 2004.

BLM held open house and public presentations on eight occasions between October 2, 2003 and January 7, 2004. Scoping comments were received from seventeen individuals and organizations. Concurrent with these actions, BLM issued a news release to local media organizations with coverage in the surrounding geographical regions.

Public and agency comments concerning the Proposed Actions are grouped according to general subject area and are summarized in **Table 1-2**. Comments received during the scoping period are included in **Table 1-2** regardless of applicability or relevance to the Proposed Projects or the EIS process. This table also provides references to sections of the EIS, which will respond to each issue raised in the comments.

TABLE I-2 Scoping Summary – North Valleys Water Projects	
Issues	**Draft EIS Section**
Proposed Action	
Include Cold Springs Valley in the EIS as it was mentioned in the Vidler Company's North Valleys Water Supply project report.	Chapter 2 – Proposed Action and Alternatives
Scope of project should not include distribution of water once it reaches terminal water storage tanks in Lemmon Valley.	Chapter I - Introduction
What is the minimum size pipe necessary to transport 8,000 acre-feet of water?	Chapter 2 – Proposed Action and Alternatives
Describe the amount of water a 32-inch diameter pipe can transport over a year.	Chapter 2 – Proposed Action and Alternatives
Identify retail purveyor of water after it reaches Lemmon Valley.	Chapter 2 – Proposed Action and Alternatives
Describe protocols that would be established to analyze and maintain operational performance standards and any contingencies should specific measures fail to meet performance criteria.	Chapter 2 – Proposed Action and Alternatives
Alternatives and Monitoring/Mitigation Measures	
All possible water pipeline corridors throughout the project area should be addressed.	Chapter 2 – Proposed Action and Alternatives
Other potential sources of water for North Valley area should be identified and assessed.	Beyond the scope of this document.
Water conservation in North Valley area should be addressed.	Beyond the scope of this document.
Monitoring of groundwater drawdown, effects on impacted aquatic systems, and loss of habitat and aquatic wildlife should be monitored to assist in implementation of mitigation measures.	Chapter 4 – Water Resources
Describe implementation of mitigation measures that include: revegetation of pipeline corridors with plant species native to the ecoregion, and monitoring of reclamation efforts (including vegetation, aquatic and terrestrial resources).	Chapter 2 – Proposed Action and Alternatives
Describe which agencies would have authority and responsibility to determine safe yield amount of groundwater extraction and exportation and which agencies would be responsible for enforcing mitigation or program performance measures.	Chapter I - Introduction
Describe mitigation monitoring and reporting program to ensure compliance and what action would be taken should extraction rate result in significant impacts.	Chapter 4 – Water Resources
Would impact threshold criteria be established to identify groundwater levels that will trigger protective enforcement action?	Chapter I - Introduction
Evaluate use of imported groundwater in rural residential areas closer to the source(s) as an alternative.	Chapter I - Introduction
Evaluate alternate pipeline route along Matterhorn Road to a terminal tank located east of proposed location.	Chapter 2 – Proposed Action and Alternatives
Existing Environment	
EIS should describe existing environment in the project area.	Chapter 3 – Affected Environment
Assess the extent to which current irrigation operations at Fish Springs Ranch would continue.	Chapter 2 – Proposed Action and Alternatives
Describe existing contamination of groundwater at Sierra Army Depot.	Chapter 3 – Water Resources
When did Fish Springs dry up?	Chapter 3 – Water Resources
Describe existing sources of water currently used in North Valley area.	Chapter 2 – Proposed Action and Alternatives
Describe groundwater flow to Pyramid Lake+	Chapter 3 – Water Resources

TABLE 1-2 (continued)
Scoping Summary – North Valleys Water Projects

Issues	Draft EIS Section
Describe surface and groundwater flow history, vegetation, dependent fish and wildlife species, flora and fauna, and populations including interstate mule deer and antelope herds and California big horn sheep and corresponding impact on related recreation (i.e. deer and chukar hunting opportunities).	Chapters 3 & 4 – Water Resources, Vegetation, Wildlife Resources
What is the quality of groundwater to be transported, especially total dissolved solids	Chapter 3 – Water Resources
Water Resources	
EIS should address the direct, indirect, and cumulative effects of groundwater withdrawal on springs, seeps, wells, and surface water in the study area.	Chapter 4 – Water Resources
Fully explain the potential for impacts to surface or groundwater quality from the proposed project including those from the Sierra Army Depot, Herlong Prison Facility, municipal and industrial practices in the North Valleys, and wastewater treatment and disposal resulting from the North Valleys project.	Chapter 4 – Water Resources
Evaluate the environmental impacts of increasing total dissolved solids in the Truckee River and Pyramid Lake through effluent treatment or seepage.	Chapter 1 - Introduction
A hydrologic model assessing the effects of pumping on groundwater levels, spring discharges, and surface water should be developed.	Chapter 3 – Water Resources
Identify and map all affected water bodies, including isolated springs and wetlands.	Chapter 3 – Water Resources
Groundwater drawdown zones and extent of drawdown at specific time intervals over the life of the project should be identified and displayed on maps in the EIS.	Chapters 3 & 4 – Water Resources
Describe potential direct, indirect, and cumulative effects of groundwater withdrawal on surface and groundwater sources that could affect Pyramid Lake and Pyramid Lake Paiute Tribe.	Chapter 4 – Water Resources
Describe additional wastewater treatment facilities necessary as a result of increased development	Chapter 1 - Introduction
Describe the difference between gross and net groundwater extraction, recognizing some net recharge in an agricultural operation occurs.	Chapter 3 & 4 – Water Resources
Evaluate the possibility of 8,000 acre-feet being exported to Reno (North Valleys) and remainder (5,000 AF) being applied to Fish Springs Ranch alfalfa fields for a total extraction of 13,000 AF.	Chapter 2 – Proposed Action and Alternatives
Evaluate potential changes in area recharge from proposed extraction and export from Dry Valley.	Chapter 4 – Water Resources
Would monitoring wells be required to monitor effects of the project and develop information to help guide future management decisions?	Chapter 4 – Water Resources
Discuss replacement of Truckee River water with proposed project water and effects on Truckee River.	Chapter 1 - Introduction
Potential effects of groundwater pumping in Dry Valley on surface water and subsurface inflow to Honey Lake basin via Long Valley Creek should be addressed.	Chapter 4 – Water Resources
Could ongoing extraction cause the SIAD contamination plume to migrate into a larger area, or cause poorer quality water from the central portion of the basin to enter the proposed well field?	Chapter 4 – Water Resources
Describe impacts of proposed project on stream flow of Long Valley Creek.	Chapter 4 – Water Resources
Describe quantity and quality of existing surface and groundwater sources in the study area.	Chapter 3 – Water Resources
Describe the cumulative effects of groundwater drawdown of all wells that would be in operation over the life of the projects.	Chapter 1 – Introduction Chapter 4 – Water Resources
Describe groundwater flow to Pyramid Lake.	Chapter 3 – Water Resources

TABLE 1-2 (continued) Scoping Summary – North Valleys Water Projects	
Issues	**Draft EIS Section**
Describe effects on groundwater recharge rates due to increase in impervious surfaces associated with new development resulting from proposed project.	Chapter 1 - Introduction
Evaluate potential impacts to Amadee Hot Springs and associated wetlands from groundwater pumping.	Chapter 4 – Water Resources
Evaluate potential impacts from groundwater withdrawal on springs in Skedaddle and Peterson Mountains.	Chapter 4 – Water Resources
Evaluate potential impacts to municipal water supply systems at Sierra Army Depot and Herlong Utilities Cooperative.	Chapter 4 – Water Resources
Evaluate effects of groundwater withdrawal in Honey Lake Valley on groundwater remediation modeling being conducted at the Sierra Army Depot.	Chapter 4 – Water Resources
Describe effects to surface and groundwater resources from animal waste contamination of runoff, damage to riparian areas, and proposed mitigations resulting from conversion of irrigated agricultural production to non-irrigated cattle grazing.	Chapter 2 – Proposed Action and Alternatives Chapter 4 – Water Resources
Describe the effect of treated effluent discharge into Swan Lake, Whites Lake, Silver Lake and/or other existing playas in the Lemmon Valley hydrographic basin on base flood elevations associated with those water bodies.	Chapter 2 – Proposed Action and Alternatives Chapter 4 – Water Resources
The EIS should address whether approval by the State Engineer is necessary for interbasin transfer if treated effluent is to be piped out of Lemmon Valley hydrographic basin to Truckee Meadows hydrographic basin or other location.	Chapter 1 - Introduction
Describe the age and origination of well field groundwater that contributes to well field production.	Chapter 3 – Water Resources
Identify impacts of wastewater disposal in a closed hydrographic basin.	Chapter 1 - Introduction
Identify positive benefits of the projects such as serving development of the growth corridor per the regional plan.	Chapter 1 - Introduction
What is the quality of groundwater to be transported, especially total dissolved solids.	Chapter 3 – Water Resources
Address whether water resources resulting from the proposed projects would be provided exclusively within Truckee Meadows Service Areas (TMSA) as defined in the Truckee Meadows Regional Plan (May 2, 2002, as amended).	Chapter 1 - Introduction
Determine if Truckee River water now serving North Valleys will be brought back to the Truckee Meadows service area, and if so, how and where should it be allocated?	Chapter 1 - Introduction
Evaluate the potential direct, indirect, and cumulative effects of these projects, if any, on wetlands and associated resources in Warm Springs (Palomino) Valley to the southeast.	Chapter 1 – Introduction Chapter 4 – Water Resources
Discuss relationship and potential effects to Winter's Doctrine water held by Pyramid Lake Paiute Tribe.	Chapter 4 – Water Resources
Describe potential effects of groundwater removal on existing wells in the eastern portion of Honey Lake Valley basin.	Chapter 4 – Water Resources
Describe the safe annual extraction levels in Dry Valley, Bedell Flat and Honey Lake Valley.	Chapter 1 – Introduction Chapter 4 – Water Resources
Water Rights	
Evaluate water rights associated with current and future needs.	Chapter 1 – Introduction Chapters 3 & 4 – Water Resources
Vegetation	
Evaluate any increased risk for establishment of invasive plant species, and disclose measures that would be taken to avoid such an impact.	Chapter 1 – Introduction Chapters 3 & 4 – Vegetation/Grazing Management

TABLE I-2 (continued)
Scoping Summary – North Valleys Water Projects

Issues	Draft EIS Section
Describe effects of Project on high desert habitat.	Chapter 4 – Vegetation
Disclose the potential for reducing native biological diversity, including the potential for increased risk of displacement of native habitats by cheatgrass.	Chapter 4 – Vegetation
Evaluate the effects of groundwater removal on phreatophytic plant communities.	Chapter 4 – Vegetation
Evaluate impacts to native and medicinal plants.	Chapter 4 – Vegetation Chapters 3 & 4 – Cultural Resources
Effects of habitat fragmentation from pipeline corridor on sagebrush, bitterbrush, shadscale, and greasewood plant communities.	Chapter 4 – Vegetation
Evaluate potential effects on vegetation resulting from groundwater withdrawal.	Chapter 4 – Vegetation
Wildlife	
Evaluate the effects of groundwater removal on resting, feeding, and nesting habitat for migratory waterfowl and shorebirds	Chapter 4 – Wildlife Resources
Evaluate potential effects to Lahonton Cutthroat Trout and Cui-cu in Pyramid Lake from groundwater withdrawal	Chapter 4 – Wildlife Resources
Potential impact on biological components, including destruction or alteration of breeding, nesting, cover, migration, and foraging habitats, should be described.	Chapter 4 – Wildlife Resources Chapter 4 – Threatened, Endangered, Candidate, and Special Status Species
Consult U.S. Fish and Wildlife Service and Nevada Division of Wildlife regarding Project.	Chapter 1 –Introduction Chapter 4 – Threatened, Endangered, Candidate, & Special Status Species Chapter 5 – Consultation, Coordination, and Preparation
Describe indirect effects on wildlife habitat from increased development in North Valleys Planning Area as a result of increased availability of water	Chapter 4 – Wildlife Resources
Evaluate impacts to Doyle and Hallelujah Junction Wildlife areas from pumping groundwater.	Chapter 4 – Water and Wildlife Resources
Evaluate the effect of vehicle mortality on wildlife (particularly deer) from projected development in the North Valleys Planning Area.	Chapter 1 –Introduction
Assess potential effects to Honey Lake and Honey Lake Valley, Pyramid Lake and surrounding area, and affected springs and wetlands as resting, feeding, and nesting habitat for migratory waterfowl and shorebirds.	Chapter 4 – Water and Wildlife Resources
Describe effects on wetlands and tundra swan wintering area (Swan Lake Nature Study Area) if additional levels of effluent are discharged into Swan Lake and whether it is covered under the Migratory Bird Treaty Act.	Chapter 1 –Introduction
Effects of discharge from wastewater treatment facilities on fish and wildlife resources.	Chapter 1 –Introduction
Raptor nest sites, sage grouse habitat, winter and summer range for deer and antelope, and corridors should be identified and evaluated.	Chapters 3 & 4 – Wildlife Resources Chapters 3 & 4 – Vegetation
Effects of groundwater removal on breeding, nesting, cover, and foraging habitat for wildlife	Chapter 4 – Wildlife Resources
Evaluate impacts to wildlife habitat.	Chapter 4 – Wildlife Resources
Land clearing activities should occur outside of the avian breeding season.	Chapter 2 – Proposed Action and Alternatives Chapters 3 & 4 – Wildlife Resources

TABLE 1-2 (continued)
Scoping Summary – North Valleys Water Projects

Issues	Draft EIS Section
Fisheries and Aquatic Resources	
Assess environmental impacts of increased total dissolved solids in the Truckee River and Pyramid Lake on listed fish species.	Chapter 1 –Introduction Chapter 4 – Fisheries and Aquatic Resources
Evaluate the effects of groundwater removal on wetlands and riparian communities	Chapter 4 - Vegetation
Effects of groundwater drawdown on fish, springsnails, and other aquatic organisms.	Chapter 4 – Fisheries and Aquatic Resources
Potential effects on wetlands and associated resources in Warm Springs (Palomino) Valley	Chapter 4 - Vegetation
Evaluate potential impacts to wetlands associated with Calneva and Duck lakes.	Chapter 4 - Vegetation
Evaluate potential effects of groundwater drawdown on habitat for fish, springsnails, other aquatic organisms, and on other wildlife.	Chapter 4 – Fisheries and Aquatic Resources
Soil	
Potential for erosion of exposed soil should be described.	Chapter 4 – Soil
Evaluate potential for erosion of exposed soil and develop mitigation measures to avoid, or reduce this impact.	Chapter 2 – Proposed Action and Alternatives Chapter 4 - Soil
Aesthetic (noise and visual)	
Assess visual impact of wells, pipeline, generator, and associated buildings.	Chapter 4 – Aesthetics (Visual Resources)
Evaluate noise associated with generators, pumps, pipeline, and building construction.	Chapter 3 & 4– Aesthetics (Noise)
Threatened, Endangered, and Candidate Species/Species of Concern	
Describe impacts on federally listed species and species of concern.	Chapter 4 – Threatened, Endangered, Candidate, and Special Status Species
Evaluate potential effects on Lahontan Cutthroat Trout, Cui-ui, High Rock Spring Tui Chub, and Carson Wandering Skipper.	Chapter 4 – Threatened, Endangered, Candidate, and Special Status Species
Describe effect of groundwater withdrawal on rare and/or sensitive plant and animal species in the affected hydrographic basins.	Chapter 4 – Threatened, Endangered, Candidate, and Special Status Species
Identify federally listed species or species of concern which may occur in the area, be affected by the Project, or occur in the cumulative effects area.	Chapter 4 – Threatened, Endangered, Candidate, and Special Status Species
A Biological Assessment should be developed to evaluate potential effects on listed species.	A Biological Assessment should be developed to evaluate potential effects on listed species
The cumulative effects area for analysis of threatened, endangered, and special status species should be described.	Chapter 4 – Threatened, Endangered, Candidate, and Special Status Species Chapter 4 – Cumulative Effects
Describe effects of the Project on rare or threatened plant and wildlife species	Chapter 4 – Threatened, Endangered, Candidate, and Special Status Species

TABLE I-2 (continued)
Scoping Summary – North Valleys Water Projects

Issues	Draft EIS Section
Environmental Justice/Native American Concerns/Indian Trust Responsibilities	
Describe the potential effects of the Project on low-income and minority populations in Project area.	Chapters 3 & 4 – Cultural Resources/ Native American Religious Concerns Chapters 3 & 4 – Socioeconomic Resources
Discuss the potential for any items found along the proposed pipeline right-of-way that would be treated as culturally significant under the National Historic Preservation Act (NHPA) and/or the Native American Graves Protection and Repatriation Act.	Chapter 4 – Cultural Resources
Air Quality	
Estimate emissions for proposed project including excavation, construction, operation, and support activities.	Chapter 4 – Air Quality
Describe impacts on human health from dust emissions.	Chapter 4 – Air Quality
Evaluate impacts of groundwater withdrawal and pipeline operation, and maintenance, on air quality and dust management measures.	Chapter 2 – Proposed Action and Alternatives Chapter 4 – Air Resources
Describe possible air quality impacts, particularly with respect to particulates, resulting from conversion of irrigated agricultural land to non-irrigated cattle grazing and mitigation measures.	Chapter 2 – Proposed Action and Alternatives Chapter 4 – Air Resources
Evaluate Class I airsheds near Project area.	Chapter 3 – Air Quality
Describe air quality impacts of increased traffic generated by development resulting from proposed projects and mitigation measures.	Chapter I - Introduction
Land Use and Grazing/Recreation	
Assess impacts to open space	Chapter 4 – Land Use
Describe livestock grazing in the Project area and changes in current grazing practices and recreation use of the area.	Chapters 3 & 4 – Grazing Management Chapters 3 & 4 – Recreation and Wilderness
Power Line	
Evaluate electrical requirements during construction and operation of the Project.	Chapter 2 – Proposed Action and Alternatives
Transportation	
Evaluate potential effects of increased development due to availability of water on transportation and traffic in North Valleys Planning Area	Chapter I - Introduction
Describe impacts on regional road network from traffic generated by development resulting from the proposed project and mitigation measures.	Chapter I - Introduction
Socioeconomic	
Describe impacts to schools, public health and safety, taxes, and traffic from increased density of residential and business development in North Valleys Planning Area due to increased water supply.	Chapter I - Introduction
Potential for increased development in North Valleys due to availability of water.	Chapter I - Introduction
Socioeconomic impacts including taxes, land values, demographics, and income should be described.	Chapters 3 & 4 – Social and Economic Resources
Evaluate potential effects of increased density of residential and business development in the North Valley areas (public health and safety, schools, taxes, traffic).	Chapter I – Introduction

TABLE I-2 (continued) Scoping Summary – North Valleys Water Projects	
Issues	**Draft EIS Section**
Provide projections in 5-year increments over the next 20 years of impacts on current regional plans for development and funding of community services.	Chapter I – Introduction
Describe indirect costs of the proposed project, particularly costs of public infrastructure improvements necessary to distribute potable water and treat wastewater generated by water importation.	Chapter I - Introduction
Describe whether treated effluent would remain within Lemmon Valley hydrographic basin or be disposed of elsewhere, disposal method, and associated costs.	Chapter I - Introduction
Determine costs and impacts to existing water and sewer rates.	Chapter I – Introduction
Describe increased hazard from wildland fires for new developments in the urban/wildland interface areas of Lemmon Valley and Cold Springs Valley, mitigation measures, and associated costs.	Chapter I – Introduction
Describe direct and indirect impacts to the operations of the Reno-Stead Airport from the proposed projects.	Chapter I – Introduction
The EIS should address the Truckee Meadow Regional Plan, which establishes priorities for regional development for provision of public facilities and services to support the desired development pattern. Areas outside of regional centers, transportation corridors, and other infill areas have the lowest priority.	Chapter I - Introduction
Reasonably Foreseeable Development	
Discuss the potential for increased development to occur in the North Valleys as a result of this project, and the indirect effects on fish and wildlife resources	Chapter I - Introduction
Identify growth and development projected for the area without the projects and determine level of growth projects could support.	Chapter I - Introduction
Describe direct and indirect effects of other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions, on the same resources that would be affected by the water development projects. Other past, present, and future development projects that should be considered include: those in the Truckee River watershed, land disturbing activities along pipeline routes, areas affected by groundwater drawdown, build-out in the Cold Springs Valley, and proposed groundwater supply projects at Newcomb Lake, Bedell Flat, and Warm Springs Valley.	Chapter I – Introduction Chapter 4 – Cumulative Impacts
Evaluate impacts on development or management actions that have yet to be built or enacted, but that have been approved for construction or enactment.	Chapter 4 – Cumulative Impacts
Disclose future development at Reno Stead Airport and the acquisition of a portion of the water resources resulting from the proposed project(s).	Chapter I – Introduction
Evaluate potential development in adjacent areas of California resulting from increased development in North Valleys Planning Area of Nevada	Chapter I - Introduction
Evaluate cumulative effects of water importation and proposed power line development	Chapter I – Introduction Chapter 4 – Cumulative Impacts
Disclose and discuss all speculative possible uses of water resources including new housing in the Stead/Silver Lake/Lemmon Valley areas, the Cold Springs area, fire protection, remediation of existing deficiencies, and increased flow in the Truckee River	Chapter I - Introduction

CHAPTER 2
DESCRIPTION OF PROPOSED ACTIONS AND ALTERNATIVES

INTRODUCTION

This chapter describes the Fish Springs Ranch and Intermountain Water Supply proposals to obtain rights-of-way across public land administered by BLM for construction of water transmission pipelines and associated components. The pipelines would convey groundwater at rates of up to 8,000 acre-feet per year (af/yr) for Fish Springs Ranch Proposed Action and 3,500 af/yr for the Intermountain Water Supply Project to support projected growth in the North Valleys Planning Area north of Reno/Sparks Nevada. The applications filed by Fish Springs Ranch and Intermountain Water Supply to obtain rights-of-way across public land are referred to as the North Valleys Rights-of-Way Projects (Proposed Actions) in this document.

Alternatives considered in this EIS are based on issues identified by BLM and cooperating agencies as well as comments received during the public scoping process. Alternatives are intended to reduce or minimize potential impacts associated with the Proposed Actions while still meeting the purpose and need of the Proposed Actions.

Detailed discussions of the following topics are presented in this chapter:

- History of water projects and rights-of-way applications in the North Valleys Planning Area.
- Fish Springs Ranch and Intermountain Water Supply Proposed Actions.
- Alternatives to Proposed Actions, including the No Action Alternative and Alternatives Considered but Eliminated from Detailed Analysis.

HISTORY

Senate Bill 367 passed by the Nevada State Legislature in 1989, created a regional planning process for southern Washoe County to help resolve regional growth issues. Under this statute (NRS 278.026 – 278.029), the Truckee Meadows Regional Planning Agency was formed to develop and maintain a comprehensive Regional Plan for the jurisdictions of Reno, Sparks, and Washoe County (Truckee Meadows Regional Planning Agency 1991). The Nevada State Legislature designated Washoe County as the regional water resource management agency with responsibility to plan and manage various water-related projects for the community.

The Washoe County Comprehensive Plan includes the North Valleys Area Plan (Plan). The Plan is intended to act as a guide for the Board of County Commissioners, Washoe

County Planning Commission, and the community on matters of growth and development in the North Valleys. Per Nevada Revised Statute 278.0282, the Regional Planning Commission found the master plans for Washoe County, City of Reno, and City of Sparks to be in conformance with the Truckee Meadows Regional Plan.

The North Valleys Planning Area includes Antelope Valley, Cold Springs Valley, Lemmon Valley, Red Rock, and Bedell Flat hydrographic basins, which are designated as groundwater systems. The Planning Area covers approximately 245 square miles but excludes the City of Reno in the Stead area. The Plan guides growth by recognizing critical conservation areas, establishing existing and future land use and transportation patterns, and identifying current and future public services and facility needs.

To accommodate planned development of Lemmon Valley and Spanish Springs Valley in a manner consistent with goals of the Truckee Meadows Regional Plan, a reliable source of high-quality water to provide 250 gallons per day per capita is essential. In March 1991, the Nevada State Engineer approved Washoe County's plan to import 13,000 af/yr of groundwater from Honey Lake Valley approximately 40 miles north of Reno. The State Engineer's decision was appealed by Lassen County, California (which is located adjacent to Washoe County, Nevada), and the Pyramid Lake Paiute Tribe. The State Engineer's approval was reversed and remanded in 1992 by Second Judicial Court in Reno. In October 1992, the State Engineer issued a Supplemental Ruling that again approved inter-basin transfer of 13,000 af/yr. A motion to vacate that ruling was denied by the Second Judicial Court in February 1993. The case was subsequently appealed to the Nevada Supreme Court, which confirmed the Supplemental Rulings on Remand in June 1996.

In August 1989 and April 1992, Washoe County applied to BLM for two rights-of-way to cross public land for purposes of installation of a water transmission pipeline (N-51606) that would connect water wells at Fish Springs Ranch in Honey Lake Valley through Bedell Flat to Lemmon Valley. The proposed water pipeline would extend approximately 38 miles. The second right-of-way application was for purposes of installing a 58-mile gas pipeline (N-55747) to power pumps that would transport the water. The gas pipeline would originate near Wadsworth, Nevada and terminate at Fish Springs Ranch.

Granting the rights-of-way would have allowed Washoe County to proceed with plans to construct the Truckee Meadows Project and supply future residents of Lemmon and Spanish Springs valleys with water from Honey Lake Valley through year 2015. The project was designed to serve a total population of 46,500. In response to overdraft of groundwater in Lemmon Valley basin (which resulted in a moratorium on development in Lemmon Valley), Washoe County adopted a policy that required adequate water rights as a condition of approval of any subdivision in the planning area.

A Draft EIS was prepared by BLM (1993) in response to Washoe County's rights-of-way application. One of the primary issues and concerns addressed by the EIS was the potential impact of proposed groundwater withdrawal on existing water users in Honey

Lake Valley. As a result, groundwater studies were implemented to provide data for analysis in the 1993 EIS.

As part of a groundwater study for the Honey Lake Valley area, a U.S. Geological Survey (USGS) model was used to simulate groundwater conditions in eastern Honey Lake Valley, including the Fish Springs Ranch area (Handman *et al.* 1990). For the 1993 Draft EIS analysis (BLM 1993), the USGS model was extended 3 miles westward to include the Sierra Army Depot at Herlong, California. The Sierra Army Depot considered results of the groundwater analysis to be flawed and suggested that project implementation would result in adverse impacts to on-going efforts to remediate groundwater contamination at the Depot. The project was also opposed by the Pyramid Lake Paiute Tribe due to conflicts with preliminary settlement of the Truckee River negotiations between the Tribe and Sierra Pacific Power Company, and the Tribe's claims to groundwater rights beneath the Smoke Creek Desert area at the north end of the Reservation. As a result of these issues, work on the EIS was suspended by the Secretary of the Interior in 1994 pending resolution of the following issues: 1) concurrence of USGS on regional groundwater modeling; 2) Sierra Army Depot groundwater contamination; and 3) concurrence from the Pyramid Lake Paiute Tribe on Trust Responsibility issues.

Although the Proposed Actions described in this EIS are similar to the 1993 Draft EIS project, proposed groundwater withdrawal rates have been revised by current Project proponent (Fish Springs Ranch) and groundwater modeling has been completed with US Geological Survey review. In addition, Sierra Army Depot has developed and implemented a groundwater control and treatment program to address contamination at that site. Trust Responsibility issues raised during the 1993 Draft EIS have been addressed as a result of reduced groundwater pumping rates included in Fish Springs Ranch's proposed Project.

In November 1996, the State Engineer informed Washoe County that action on the interbasin change application was necessary to maintain compliance with NRS 533.370(1)(c)(2). Washoe County responded with a request for an extension of time in order to consider all water supply options and alternatives for the North Valleys Planning Area. An Option/Acquisition Agreement between Washoe County and Northwest Nevada Water Resources, Ltd., (the predecessor to Fish Springs Ranch, LLC), which would have transferred water rights to Washoe County has expired by its terms. Because of expiration of the Option, the underlying base rights of the water right permits remain with Fish Springs Ranch LLC and will be the subject of importation of a portion of those rights (8,000 af/yr) into the North Valleys Planning Area as part of the Proposed Actions described in this EIS.

In 2002, the Washoe County Regional Water Planning Commission retained ECO:LOGIC Consulting Engineers to provide a detailed analysis of water supply alternatives to support projected growth estimates in the Stead, Lemmon Valley, and Cold Springs areas of Washoe County. Three scenarios were developed that would meet future water needs for the Stead/Lemmon Valley areas. Two of the scenarios were variations of the Vidler Water Company (Fish Springs Ranch) and

Intermountain Water Supply projects addressed in this document, and the third being replacement of Truckee Meadows Water Authority's Stead main to accommodate increased water from the Truckee River. The study noted that integrating Truckee Meadows Water Authority and Washoe County water systems could effectively meet existing demands in the North Valleys Planning Area but would not provide sufficient amounts to meet projected build-out needs. The report concluded that development of the water importation projects would provide greater benefits at a lower cost to the North Valleys Planning Area compared with the Stead Main alternative (ECO:LOGIC 2002).

PROPOSED ACTIONS

The Proposed Actions are to install water pipelines and ancillary facilities on public and private land to convey groundwater from Honey Lake Valley, Dry Valley, and Bedell Flat hydrographic basins for municipal use in the Stead/Lemmon Valley areas. These areas are collectively referred to as the North Valleys Planning Area in this document. Implementation of the Proposed Actions would result in inter-basin transfer of up to 8,000 af/yr of water from the Honey Lake Valley hydrographic basin and 3,500 af/yr from the Dry Valley/Bedell Flat hydrographic basins. Locations of proposed pipeline rights-of-way are shown on **Figure 2-1**.

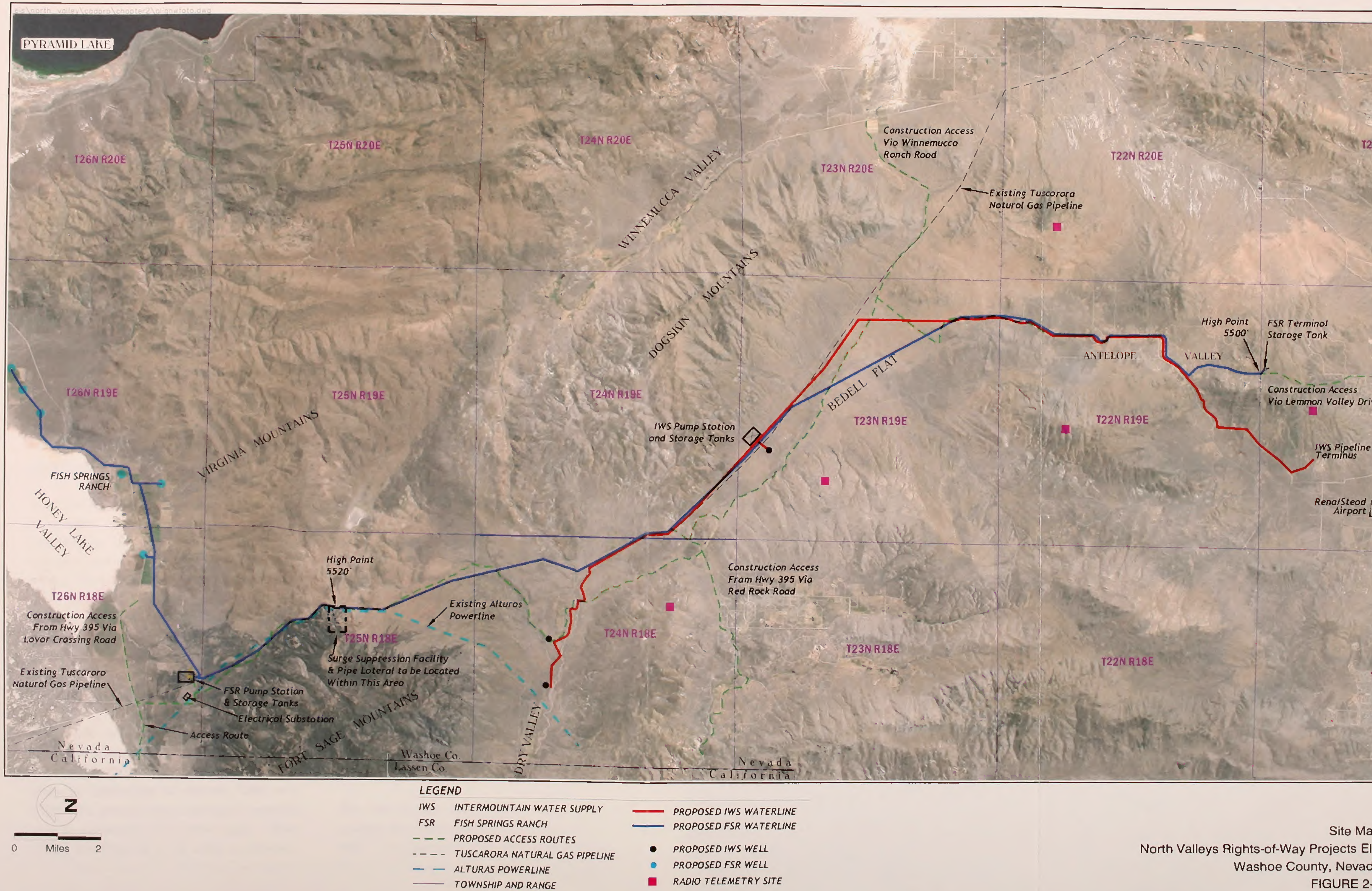
The proposed Intermountain Water Supply corridor from the Dry Valley wells would intersect and parallel the Fish Springs Ranch corridor for about 13 miles (2 miles in Dry Valley, 6 miles in Bedell Flat, and 5 miles in Antelope Valley). Eight miles of this pipeline corridor shared by Fish Springs Ranch and Intermountain Water Supply would be located within, or adjacent to, the Tuscarora Gas Pipeline right-of-way.

FISH SPRINGS RANCH PROPOSED ACTION

Fish Springs Ranch is proposing construction of production wells, water collection and transmission pipelines, pump stations, water storage tanks, electrical substation, and distribution lines to convey up to 8,000 af/yr of water to the North Valleys Planning Area. The water transmission pipeline would extend from six production wells in southeastern Honey Lake Valley southward through Dry Valley, Bedell Flat, Antelope Valley, to a terminal storage tank at the divide between Antelope Valley and Lemmon Valley.

Production Wells

Water would be supplied from six new groundwater production wells constructed in accordance with current standards and designed for maximum efficiency with a combined pumping rate of 8,000 af/yr or 5,000 gallons per minute (gal/min). Buried 12- to 24-inch diameter water collection piping would connect individual wells to two 500,000-gallon capacity storage tanks located in the southwest portion of Fish Springs Ranch. Each well would be controlled via telemetry by water levels in the storage tanks. Production wells would be gravel packed, constructed with sanitary seals to a depth 100 feet below ground surface, and equipped with water lubricated vertical turbine pumps. All production wells would be located



Site Map
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 2-1

on property owned by Fish Springs Ranch (**Figure 2-1**).

Each wellhead would be enclosed in a masonry block structure meeting current Uniform Building Code construction standards and Truckee Meadow Water Authority and Washoe County minimum design requirements. Structures would be constructed on foundations slightly elevated above surrounding grade to minimize potential for facility flooding. Each structure would contain above ground piping, shutoff valve, check valve, flow meter, air release valve, electrical equipment, and telemetry. Structures would be located on private land and have a footprint approximately 15-feet wide by 20-feet long.

Pipelines

Well Field (Collection) Pipelines

Well field or collection pipelines would consist of a main collection pipe with waterlines extending to each well. A portion of the collection pipe would be located within the Fish Springs Road right-of-way. Pipe stubs outside the right-of-way would be located on Fish Springs Ranch property. The collection pipeline would cross public land between the groundwater supply wells and pump station. Approximately 10 miles of the main well field collection pipeline would be required.

Since line pressures associated with the proposed design are less than 150 pounds per square inch (psi), well field pipelines would likely be constructed of AWWA C900 and C905 PVC pressure pipe, but other materials may be considered during final design. Sizes would vary from 12 to 24 inches in diameter with the larger diameters located closest to pump station storage tanks. Water pipe would be located underground. Appurtenant components include gate valves with valve boxes and small (3 x 2 feet) traffic-rated concrete vaults containing air release valves and blow-off valves at strategic locations.

Transmission Pipeline

Water would be pumped from the storage tanks in southeastern Honey Lake Valley over the east flank of the Fort Sage Mountains into Dry Valley, Bedell Flat, and Antelope Valley. A portion of this pipeline segment (3 miles in Honey Lake Valley, 8 miles in Dry Valley, and 5 miles in Bedell Flat) would be constructed adjacent to an existing right-of-way granted for the Tuscarora Gas Pipeline. Near the center of Bedell Flat, the Fish Springs Ranch pipeline would extend south to Antelope Valley where it would follow Antelope Valley Road within an existing Washoe County right-of-way to the intersection with Matterhorn Boulevard. The pipeline would parallel Matterhorn Boulevard southward within the existing right-of-way to a high point where it diverges east across a section of private property to the terminal storage tank located on public land. This storage tank location is on the drainage divide between Antelope Valley and Lemmon Valley. The Fish Springs Ranch water transmission pipeline would extend approximately 28 miles from the pump station in Honey Lake Valley to the terminal storage tank at an approximate elevation of 5,500 feet above mean sea level (amsl) (**Figure 2-1**).

The Fish Springs Ranch water transmission pipeline has been designed to convey 8,000 af/yr. The pipeline would have an operating

pressure in excess of 150 pounds per square inch (psi), vary from 22 to 30 inches in diameter and be buried a minimum of 3.5 feet below ground surface. The design flow rate for the pipeline and main pump station is 6,000 gallons per minute, based on continuous operation for 20 hours per day. The limiting segment of pipeline is the 30-inch diameter, 24-mile long segment from the top of the pass in the Fort Sage Mountains, elevation 5520, to the terminal storage tank site, elevation 5510. Because the elevation of these two points is essentially the same, velocity and friction losses in this pipeline segment must be kept to a minimum. This avoids the need for re-pumping in the Bedell Flat area, which would require additional infrastructure (booster pump station, power supply, surge suppression facilities, and maintenance roads).

Appurtenant facilities include air release and isolation valves and vaults, blow-off valves, cathodic protection devices, and telemetry and control facilities. These components would be located below existing grades in traffic rated, lockable, concrete vaults varying in dimension from 3 x 2 feet to 8 x 12 feet and depths up to 8 feet. These facilities would be constructed about every mile along the alignment.

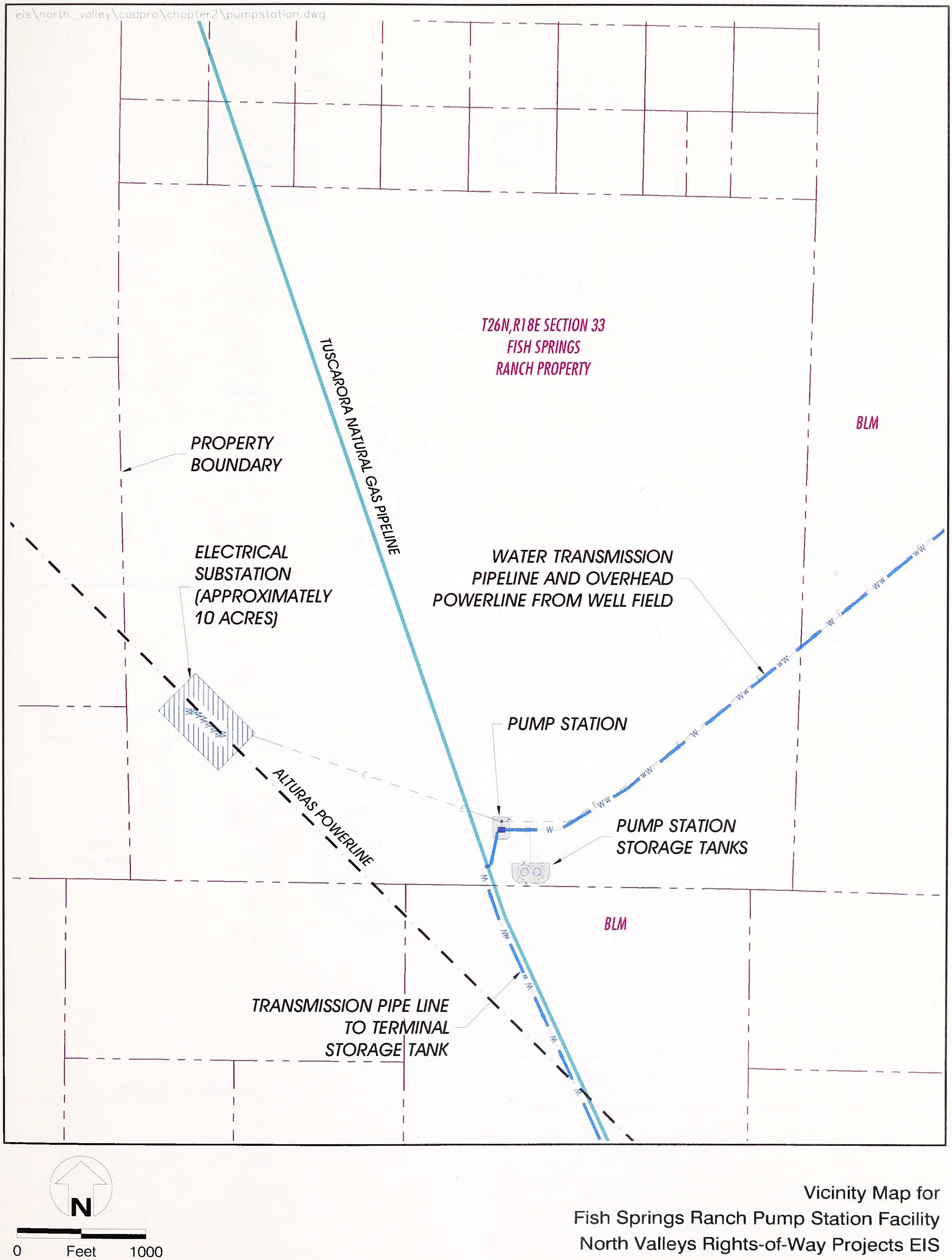
Pump Station

A pump station would be constructed adjacent to the storage tanks on Fish Springs Ranch private land in Honey Lake Valley in the SE¼ of Section 33, Township 26 North, Range 18 East, Washoe County, Nevada (**Figure 2-2**). The pump station would be designed to pump water from the adjacent storage tanks at an approximate elevation of 4,210 amsl over the east flank of the Fort Sage Mountains at a maximum elevation of 5,520 feet amsl. The pump station would be designed to provide 6,000 gpm with a discharge pressure of 670 psi. The pump station would include a minimum of six vertical turbine pumps installed in suction barrels, an electrical/control room, and chemical feed room. The pump station would be a masonry block or metal building approximately 60 feet long by 40 feet wide.

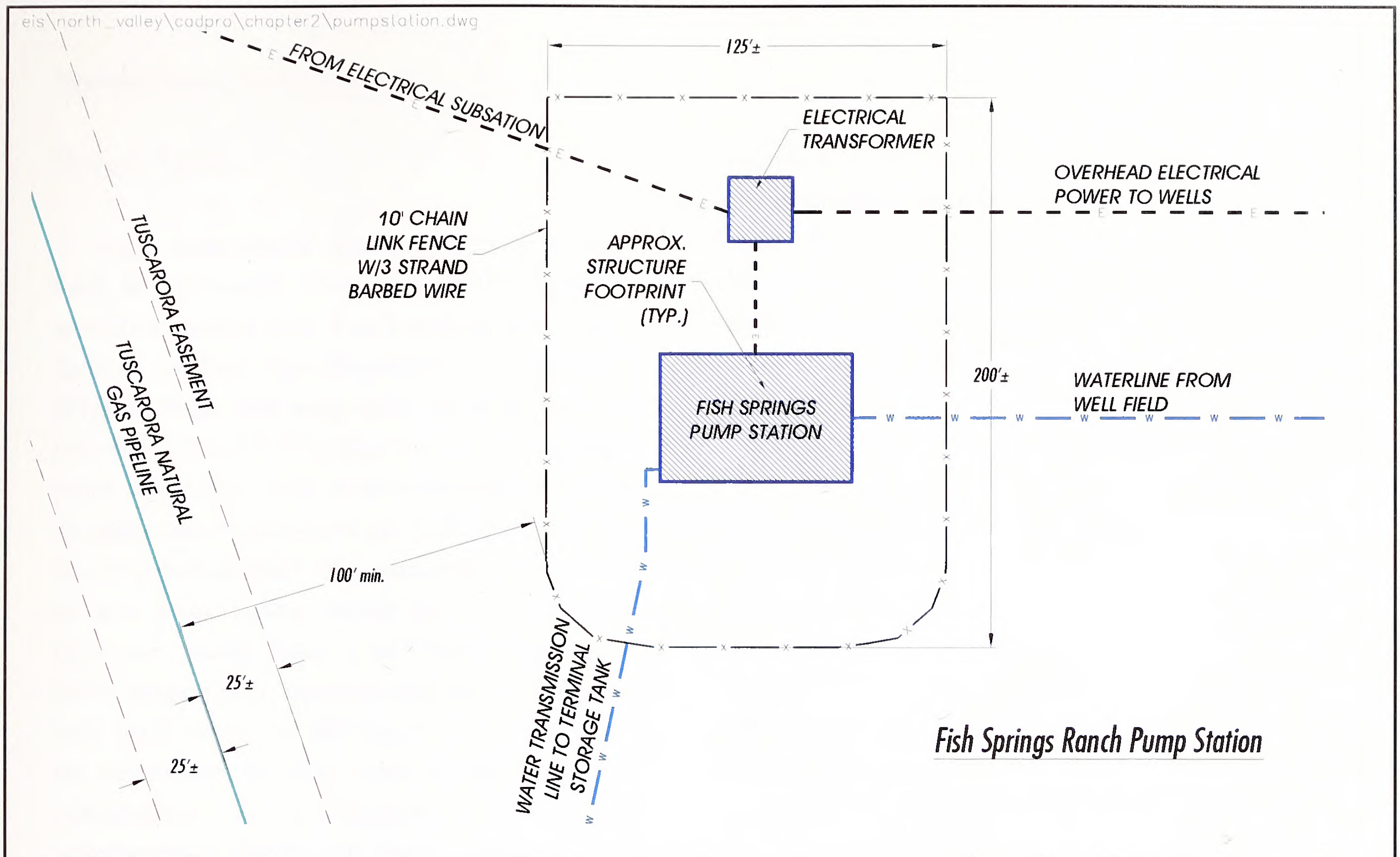
A graded level area approximately 100 x 80 feet would be required for the pump station. Cut and fill slopes would have a maximum slope of 3:1 horizontal to vertical. An all-weather surface of compacted aggregate base and crushed rock surface would be constructed around the facility. A chain link fence with three strands of barbed wire on top would be constructed around the perimeter of the site. An alarm system notifying appropriate personnel of unauthorized entry would also be installed at the station.

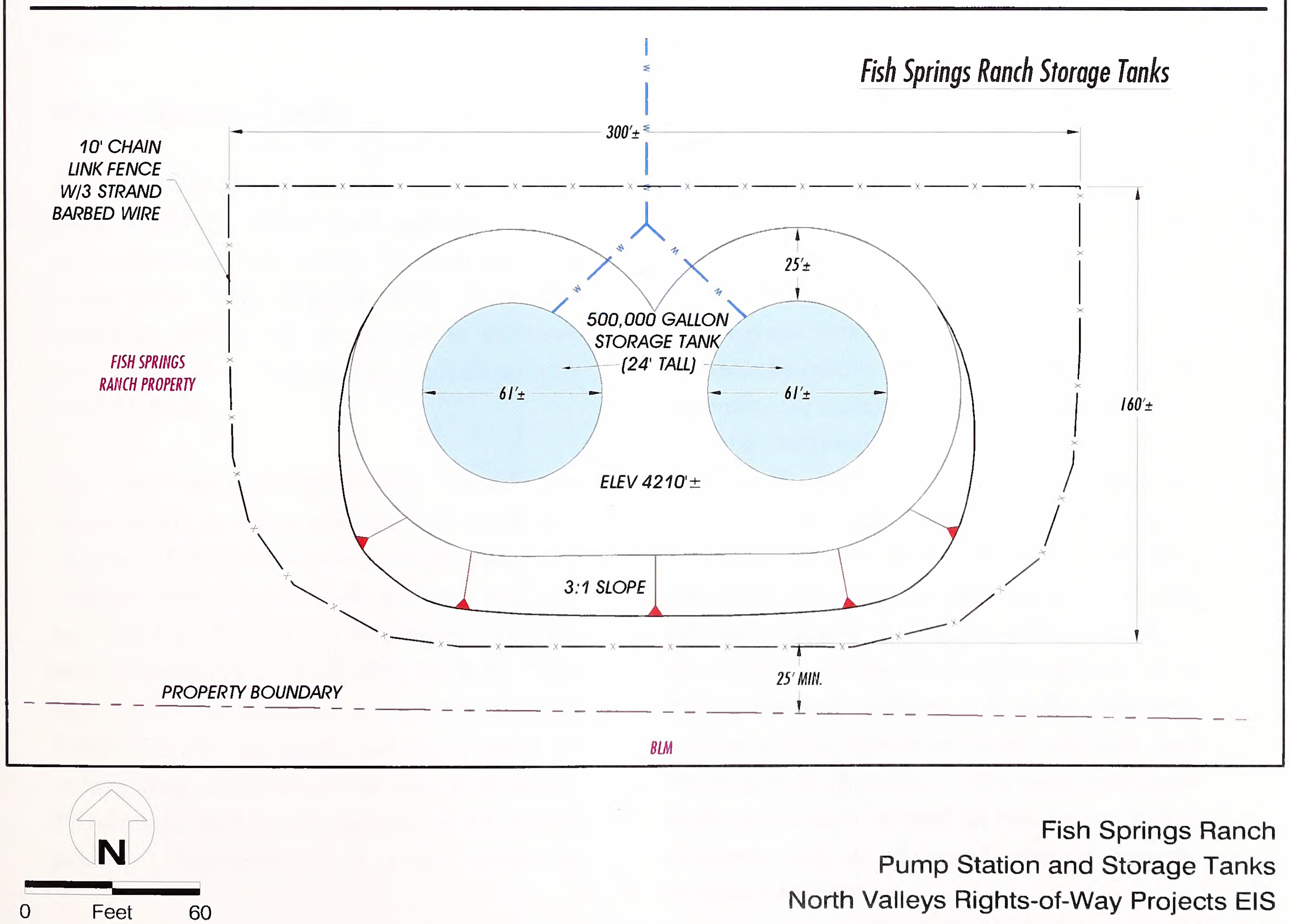
Electrical Substation

An electrical substation would be constructed on private land by Sierra Pacific Power Company adjacent to the Alturas 345 kV transmission line near the pump station (**Figure 2-3**). A 24.9 kV powerline would be installed from the electrical substation to the groundwater extraction wells. The line would be constructed using single pole structures and extend approximately 10 miles (4 miles across public land/6 miles across private land) to the groundwater extraction wells. Locations of the pumping station and electrical substation are shown on **Figures 2-2** and **2-3**.



Vicinity Map for
Fish Springs Ranch Pump Station Facility
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 2-2





Fish Springs Ranch
Pump Station and Storage Tanks
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 2-3

Surge Tank

A surge suppression facility including a tank with an estimated volume of 150,000 gallons would be located on a 1-acre site along the east flank of the Fort Sage Mountains on public land (**Figure 2-4**). The surge tank would be located between 50 and 100 vertical feet above the high point of the pass west of the distribution line at an approximate elevation of 5,520 feet amsl. A lateral pipeline from the transmission pipeline to the surge facility would be required. The tank site would have a perimeter chain link fence topped with three-strand barbed wire. A tank hatch would be fabricated with a lock box for added security and a tank ladder would be constructed in a manner to prevent unauthorized personnel from climbing the tanks.

Water Storage Tanks

Two 500,000-gallon capacity water storage tanks would be constructed adjacent to the pump station on Fish Springs Ranch property in Honey Lake Valley (**Figure 2-3**). Each tank would be 24-feet tall by 61-feet in diameter constructed of welded steel in accordance with AWWA D100.

The terminal storage tank would be constructed at a pad elevation of 5,510 feet amsl on a hillside between Antelope Valley and Lemmon Valley, immediately east and near the high point on Matterhorn Boulevard on public land administered by BLM (**Figure 2-1**). The tank would be designed in accordance with AWWA D100 standards and constructed of welded steel and measure 90 feet in diameter, 28 feet high, and have a capacity of 1.0 million gallons. Approximately 4 acres would be required for the tank. The tank site is sized to accommodate additional and/or larger storage tanks by Washoe County or the Truckee Meadows Water Authority, if needed, for distribution storage in the future. Piping to allow connection to the existing water distribution system would be provided by the water purveyor.

Storage tank sites would be graded level to minimize differential settling. Cut slopes would be terraced and planted with native vegetation for appearance and erosion control. Each site would have a perimeter chain link fence topped with three strands of barbed wire. Tanks would be constructed on a compacted aggregate foundation and painted to blend with the surrounding visual setting.

Water level in the terminal storage tank would control operation of the main pump station via telemetry. The proposed telemetry system consists of fiber optic cables between the main pump station and the terminal storage tank. The fiber optic cables would be buried in a common trench with the pipeline. Small, below-grade concrete vaults would be provided periodically (about every 5 to 7 miles) along the alignment for splicing sections of cable together. At the terminal tank site, the telemetry equipment would be configured to ultimately integrate with either the Washoe County or Truckee Meadows Water Authority telemetry control system. At the main pump station, the telemetry system to the six wells would be a continuation of the fiber optic system, or a radio telemetry system. A radio telemetry system would include a small antennae and receiver at each facility. The radio telemetry facilities would be located on Fish Springs Ranch property, and no additional repeater stations would be anticipated.

Water Treatment

A sodium hypochlorite solution would be used to disinfect groundwater and provide chlorine residual in the transmission pipeline. This solution is readily available in both drums and bulk at 12.5 percent concentration. The solution would be stored in an above ground, HDPE tank located within the pump station building. Secondary containment and related facilities would be provided in accordance with applicable Washoe County Building Department and Uniform Fire Code regulations. The storage tank would be up to 2,500 gallons in capacity. Periodic chemical deliveries would be required approximately once every three weeks.

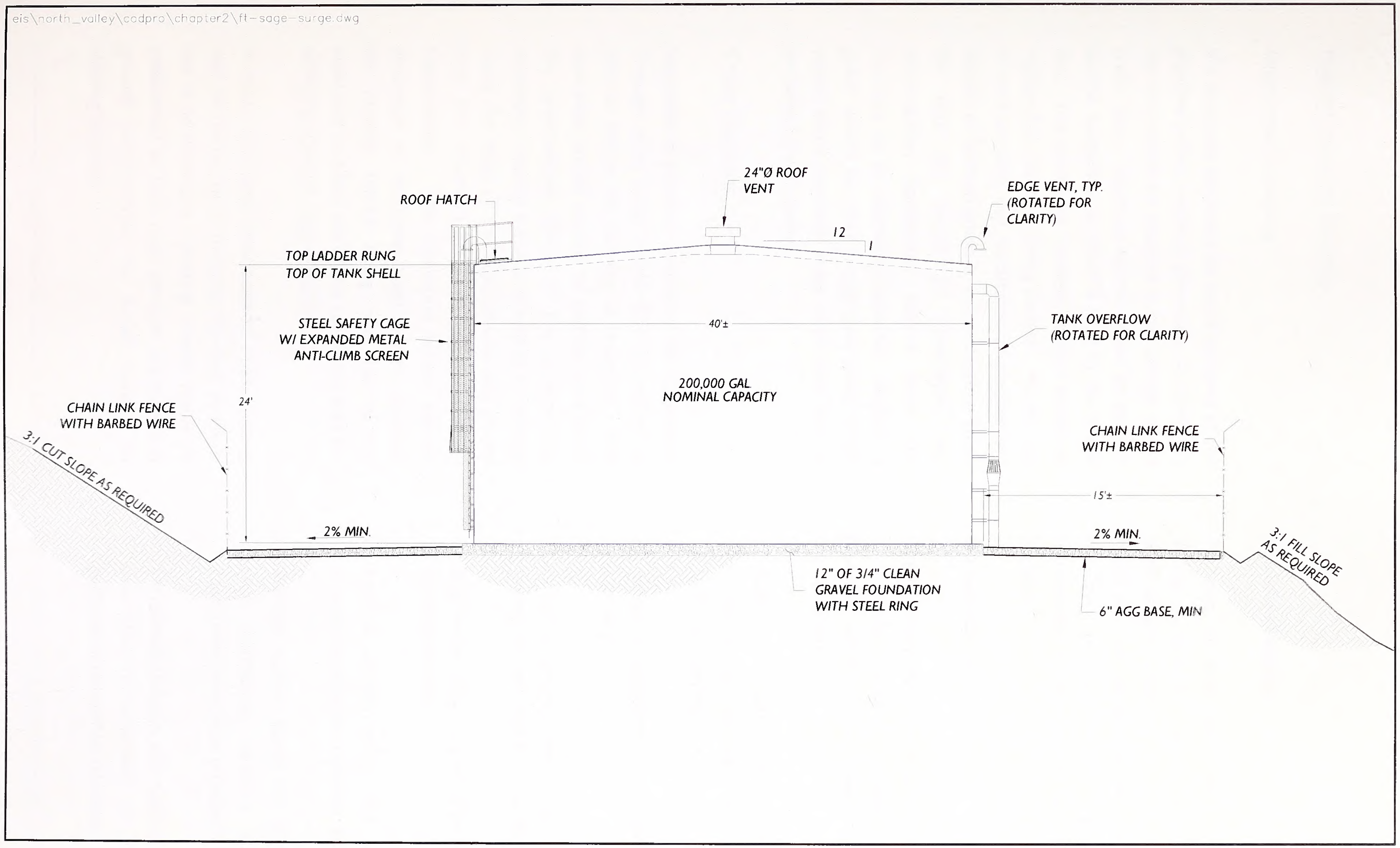
Pipeline Construction

Construction of the Fish Springs Ranch water transmission pipeline would require a permanent 50-feet wide right-of-way and an additional 25-feet width as temporary right-of-way to accommodate trench excavation, backfill, and equipment operation. Wider temporary construction easement areas (150 x 150 feet) designated for staging equipment and material would be at approximately 1-mile intervals along the pipeline route. Staging areas would not be located in drainages and would avoid known cultural resources. Prior to construction, available topsoil would be stripped and stockpiled for reclamation purposes. Existing roads and trails would be used whenever possible during construction to access the pipeline right-of-way. Construction would involve grading, trenching, installing pipe, and backfilling the trench. Once installed and operating, the permanent right–of-way for the pipeline and access road would have a width of 50 feet. During operation, the pipeline route would be inspected monthly to record corrosion-control readings. All disturbed areas would be reclaimed and revegetated.

Conventional construction techniques would be implemented for unimproved roadway, improved roadway, and cross-country segments of the pipeline. Access to proposed pipeline alignment would be via the pump station in the north, U.S. Highway 395 and Red Rock Road from the west, Winnemucca Ranch Road from the east, and Lemmon Valley Drive from the south (**Figure 2-1**).

Unimproved Roadway

Segments of pipeline proposed within unimproved roadways would be installed near the edge of the roadway or beyond the roadway drainage area. Pipe stringing and placement of pipe segments along the alignment would occur on the opposite side of the roadway from the installation side, and would be placed outside the roadway section for access and safety considerations. Trench excavation would require use of an excavator or trenching machine. Haul trucks would stage adjacent to the excavator in the roadway section, necessitating traffic control and periodic lane closures as necessary. Haul trucks would transport excavated material to pre-determined locations for processing and use as backfill. At the end of each working day, installation of pipeline and backfill to finished grade to the excavation limits for that day would be completed, and construction equipment would be removed from the roadway.



Fish Springs Ranch
Fort Sage Surge Tank Facility
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 2-4

Improved Roadway

If it becomes necessary to install portions of the pipeline within roadway pavement sections, the pipeline would be installed in the center of the traffic lane. Roadway asphalt would be saw-cut to the centerline to avoid a joint in the wheel line. The structural roadway section would be replaced to match existing surface. At the end of each working day, installation of pipeline and backfill to finished grade to the excavation limits for that day would be completed, and construction equipment moved from the roadway to an approved location. Backfill at grade would be class 2 aggregate base, which would allow roadway usage until such time as pavement is re-installed.

Cross Country

Segments of pipeline designated for installation through open areas would first be graded to provide access for delivery of materials. This operation would consist of blading an area to the approximate limits of the construction easement. Bladed material would be stockpiled along the edge of the right-of-way and placed over the disturbed area upon completion of construction. The operation would use an excavator or trenching machinery to excavate the pipeline trench along one side of the easement to allow use of the remaining area for stringing pipe and staging materials.

In areas with hard, unweathered rock, blasting may be necessary to fracture the rock to allow use of an excavator. Blasting criteria would be established to limit peak particle velocities and ground accelerations to avoid damage to existing facilities.

Backfill Material

Portions of excavated material encountered during construction would be screened and used as pipe bedding. Screened by-products could be used as intermediate backfill, spread on the surface of the right-of-way, or transported off-site to an approved disposal location.

Stream Crossings

The following measures would be implemented where the proposed water transmission pipeline would cross streams, wetlands, or riparian areas:

- Expedite construction in streams and wetlands to minimize the duration of turbidity-causing activities.
- Select an alignment that minimizes stream crossings.
- Schedule construction of stream crossings during periods of low or no flow.
- Implement temporary erosion and sediment control practices.
- Restore stream banks and wetlands to original configuration as soon as possible.
- Stabilize stream banks and adjacent areas with permanent erosion control and vegetation as soon as possible.
- Periodically inspect the right-of-way during and after construction to identify and perform maintenance activities.

Proposed Resource Monitoring

Groundwater

Fish Springs Ranch has proposed a monitoring program to document changes that occur in groundwater levels and quality in the eastern Honey Lake Valley area. The monitoring program would document changes associated with existing agricultural pumping as well as changes that may be caused by the transition to a municipal well field. This data base would be used for well field management and model validation. The elevations and locations of the monitoring wells have been surveyed to allow the determination of hydraulic gradients. Monitoring well locations are shown on **Figure 2-5**.

Water level monitoring in southeastern Honey Lake Valley commenced in some wells as early as 1989 and periodic measurements were collected through 1999. In 2003, Fish Springs Ranch equipped thirteen wells with recording pressure transducers that record water levels hourly. In late 2004, a residential well (Schaufus) located near the eastern half of the well field was incorporated into the network and is equipped with a recording pressure transducer.

Data would be downloaded quarterly and the accuracy of the measurements checked with manual measurements using an electric sounder. The monitoring network would be expanded to include a monitoring well near the California-Nevada State Line. Future monitoring will be accomplished by a combination of the efforts of the Nevada Division of Water Resources and the well field operator.

Well Field

Production Wells – Production wells for the Fish Springs Ranch Project would be equipped with flow meters to record cumulative well production. Cumulative well production would be recorded at least once per month along with manual measurements of the depth to the water table at each production well. Maintenance workers or other regulatory mandated personnel would collect water quality samples that may be required to comply with the Safe Drinking Water Act and other applicable water quality regulations.

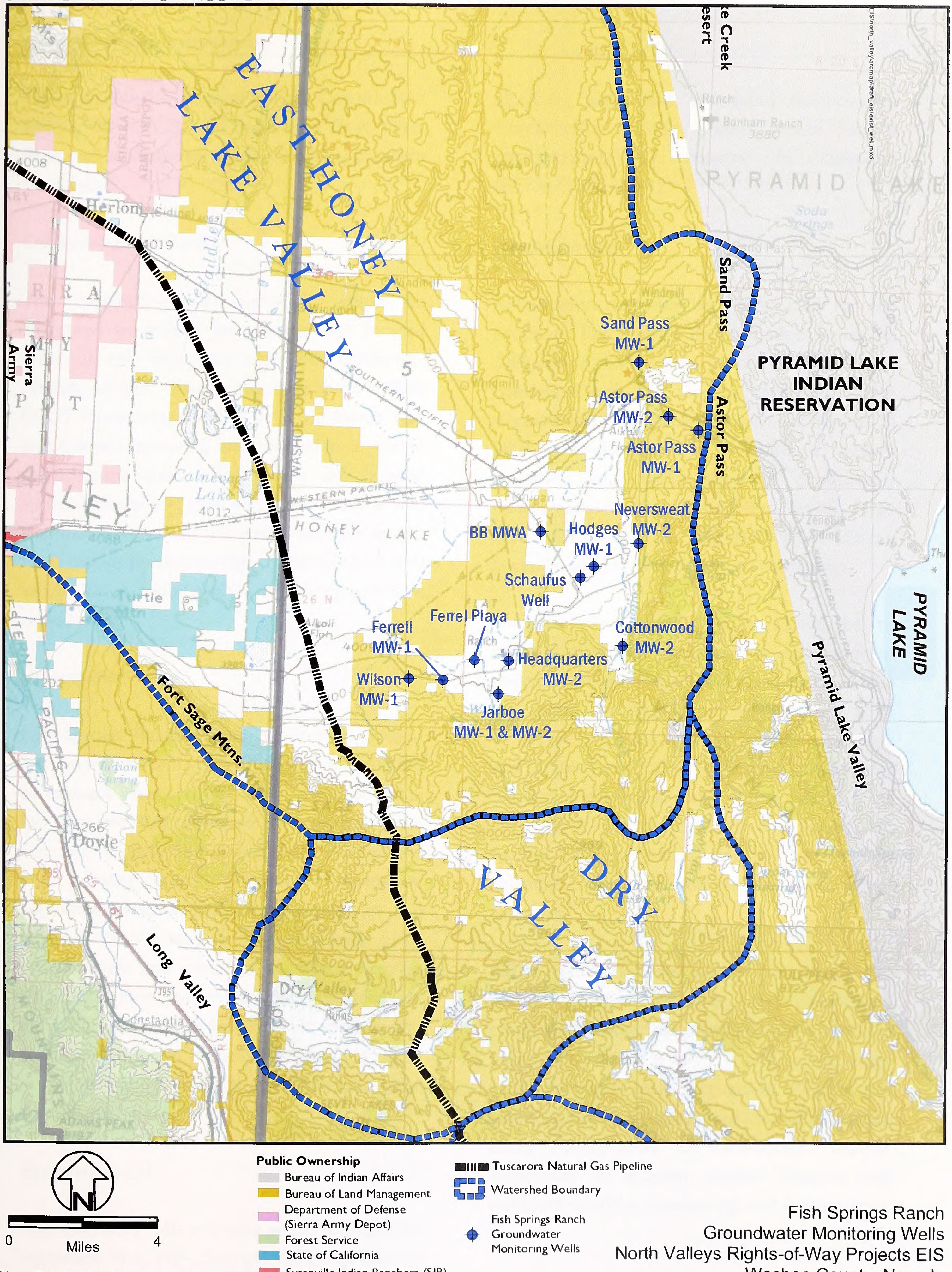
Monitoring Wells – The current and future monitoring network includes one monitoring well located within a few hundred feet of each existing production well and completed in the same water-bearing horizon as the production well. Each existing well is currently equipped with a recording pressure transducer. These include: Wilson MW-1, Ferrell MW-1, Jarboe MW-1, Headquarters MW-2, and Hodges MW-1. In addition, Jarboe MW-1 tracks water levels in alluvial deposits which overlie the volcanic rock aquifer at that locale.

Sand and Astor Pass

The monitoring network includes the Sand and Astor Pass areas. One monitoring well is located in the Sand Pass area (Sand Pass MW-1) and two monitoring wells are located in the Astor Pass area (Astor Pass MW-2). Each is equipped with a recording pressure transducer.

Well Field Perimeter Wells

The monitoring network includes four wells located around the perimeter of the well field.



Note: Data for Nevada are from the Bureau of Land Management Geographic Information System database.

Fish Springs Ranch
Groundwater Monitoring Wells
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 2-5

These include Neversweat MW-2, Cottonwood MW-2, BB MW-A, and the Ferrel Playa Well. Each well is equipped with a recording pressure transducer.

California-Nevada Border

The monitoring well network would be expanded to include an existing well located west of the well field near the California-Nevada border. Two prospective wells include USGS Monitoring Well 3 or a California Fish and Game monitoring well located at a wildlife management area. Both wells are located approximately one mile west of the state line. Permission to utilize the well would be sought from the respective owners. The selected well would be equipped with a recording pressure transducer.

Vegetation

Fish Springs Ranch would monitor vegetation for a minimum of 2 years following construction to evaluate revegetation trends, check potential for erosion, and compare revegetation with adjacent undisturbed vegetation. During the first growing season following revegetation, reclaimed areas would be quantitatively and qualitatively evaluated to determine initial plant establishment and identify areas where erosion may occur. First year monitoring would include plant density, percent woody plant survival, and total canopy cover. Measurements would occur in random plots in each re-established plant community.

Employment

Approximately 160 workers would be used to construct the Fish Springs Ranch proposed pipelines, wells, and associated components. Construction of the Project would require approximately 11 months to complete (ECO:LOGIC 2004).

Reclamation

Reclamation activities on public land for the proposed Fish Springs Ranch Project would be designed to achieve post-construction land uses consistent with the Carson City Field Office Consolidated Resource Management Plan (BLM 2001a). Reclamation is intended to return disturbed land to a level of productivity comparable to pre-construction levels. Post-construction land use includes wildlife habitat, livestock grazing, and dispersed recreation.

Short-term reclamation goals would be to stabilize disturbed areas and protect adjacent undisturbed areas from unnecessary or undue degradation. Long-term reclamation goals would ensure public safety, stabilize the sites, and establish productive vegetative communities consistent with post-construction land use. As sections of the pipeline are completed, Fish Springs Ranch would initiate reclamation activities concurrent with ongoing construction activities.

Areas disturbed during construction of the Fish Springs Ranch pipeline and associated components would be rehabilitated to minimize potential for erosion and encourage establishment of native vegetation. This process includes topsoil salvage, recontouring disturbed areas, distribution of stockpiled topsoil, installation of erosion control features and products, seeding, monitoring, and maintenance.

As the trench excavation and pipeline construction advances, a minimum of 3 inches and maximum of 12 inches of topsoil would be salvaged. Topsoil would not be salvaged where noxious weeds are present. Topsoil storage piles would be placed along the edge of the right-of-way and protected. After the trench has been backfilled, right-of-way regraded, and subsoil ripped to reduce compaction, topsoil would be re-distributed over the area and seeded. Seed mixtures would include species present in pre-construction communities. Use of native grasses, forbs, and shrub species would be emphasized.

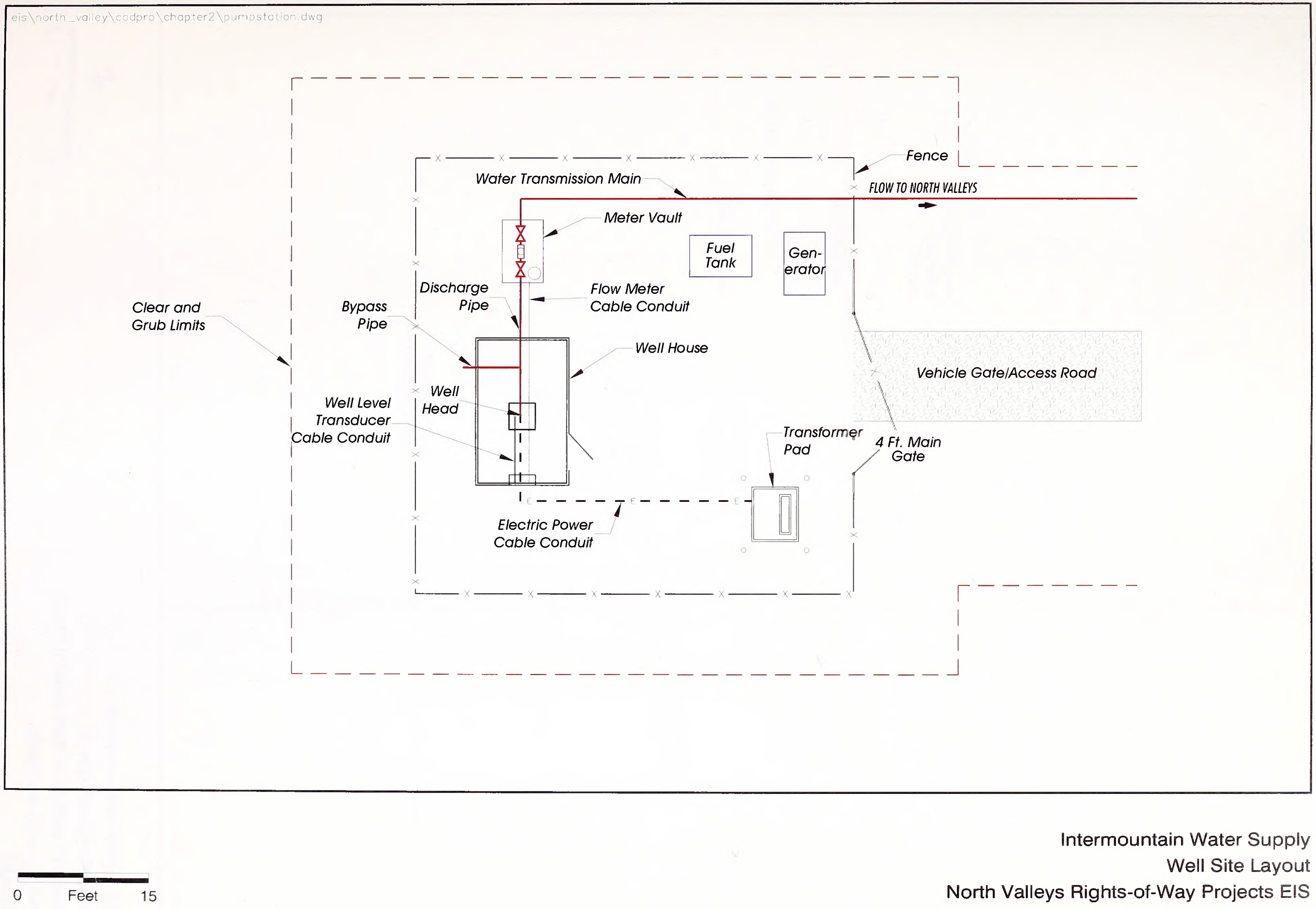
Temporary and permanent erosion control measures would be installed during construction. Temporary structures would remain in-place until permanent revegetation and erosion control devices are effective. During construction, water bars, silt fencing, straw bale sediment barriers, erosion control matting, interim mulching, and water flow energy dissipaters would be installed. Erosion and sediment control measures would be regularly monitored and maintained during the project. Erosion control measures would be in accordance with Best Management Practice (BMPs) as defined by the Nevada State Conservation Commission (1994).

INTERMOUNTAIN WATER SUPPLY PROPOSED ACTION

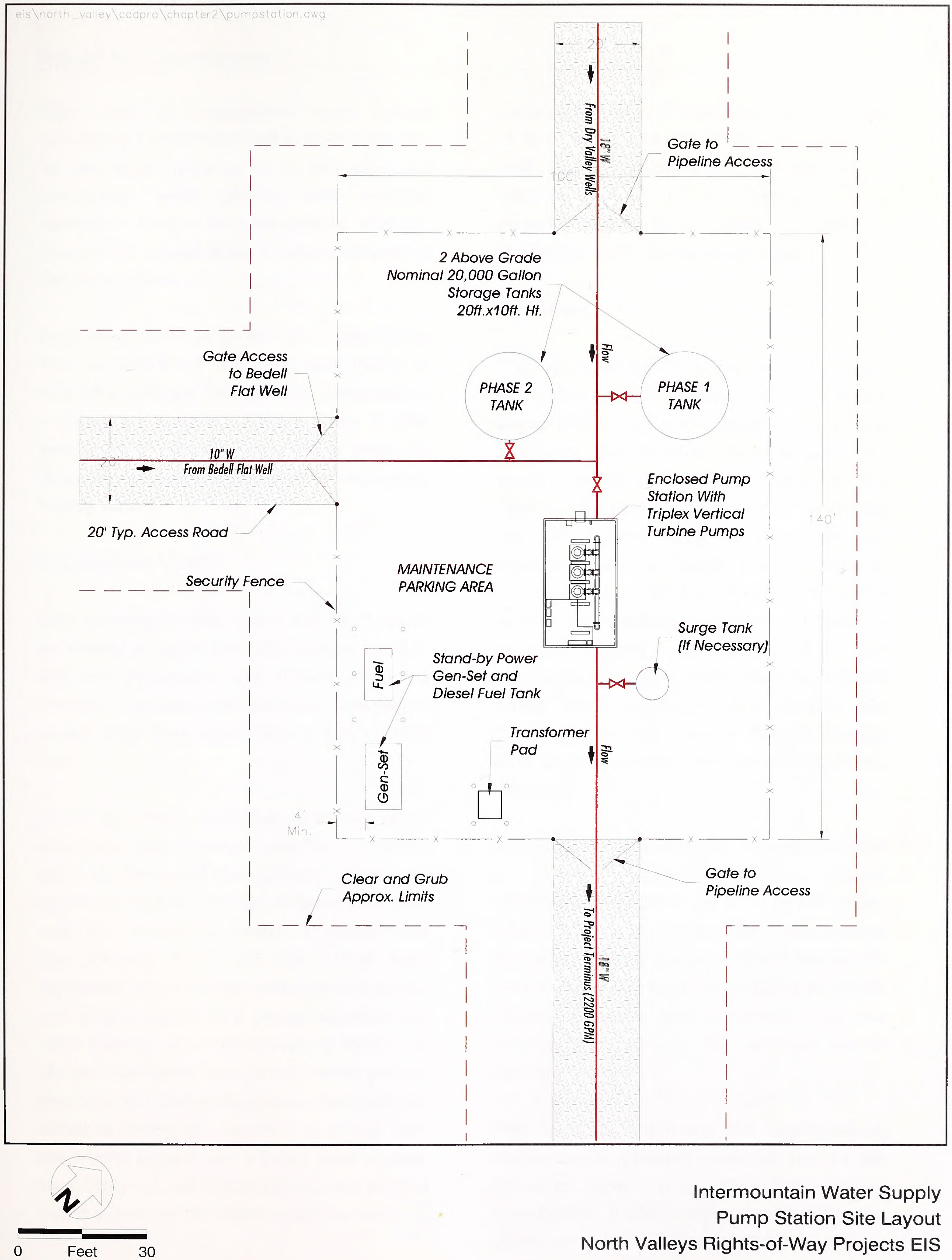
Intermountain Water Supply is proposing construction of water production wells, water collection and transmission pipelines, pump station, two water demand tanks, diesel powered generators, and electrical distribution lines to convey water from Dry Valley (two wells) and Bedell Flat (one well) approximately 24 miles to a pipeline terminus in Lemmon Valley. A pipeline terminal storage tank would be provided by Washoe County, Truckee Meadows Water Authority, or other private entities. Intermountain Water Supply pumping and pipeline facilities would be sized to convey approximately 3,500 af/yr. Proposed Intermountain Water Supply project components are shown on **Figures 2-6** and **2-7**.

Development of the Intermountain Water Supply Project would occur incrementally in three stages. The first stage would involve completing one production well in Dry Valley (DV-1), installing a water transmission pipeline from DV-1 to a pipeline terminus in Lemmon Valley, constructing a pump station, installing two water demand tanks in Bedell Flat, and installing radio telemetry towers. The first stage would provide up to 1,500 af/yr to Lemmon Valley.

Second stage of development would involve completing a second production well in Dry Valley (DV-2, approximately 1 mile west of well DV-1), installing connecting water pipeline, and constructing electrical distribution lines to the two production wells and booster pump station in Bedell Flat. The DV-2 well would also produce up to 1,500 af/yr. Electrical power for the two production wells would be provided by Plumas-Sierra Rural Electric Cooperative from existing service in Constantia, California. Power to the pump station would also be provided by Plumas-Sierra Rural Electric Cooperative, but would originate from existing lines in Red Rock Valley.



Intermountain Water Supply
Well Site Layout
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 2-6



Intermountain Water Supply
Pump Station Site Layout
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 2-7

Third stage of development would include completing a production well in Bedell Flat (BF-1) that would produce up to 500 af/yr, and connecting water pipeline and electrical distribution lines to the pump station. Well BF-1 would be located about ½-mile southwest of the pump station.

Four diesel powered generators – one 750-hp each at wells DV-1 and DV-2, one 105-hp at well BF-1, and one 750-hp at the pump station – would be installed. During Phase 2 after installation of electrical distribution lines, the diesel generators would be used for emergency backup power.

Production Wells

Two production wells (DV-1 and BF-1) would be located on public land administered by BLM, and one production well (DV-2) would be located on private land. Estimated well depths would range from approximately 500 to 1000 feet.

A 750-hp diesel powered generator would initially be used to power well DV-1. A 4,000-gallon double-walled aboveground storage tank would be used for storage of diesel fuel. Each well site would be within a fenced area approximately 50 x 50 feet. Well head equipment would include vertical turbine pumps and level controls, yard piping, electrical and cable conduit, flow meter vault, a 10-foot by 18-foot well house with various valves, meters, electrical, and control equipment. Each well site would be fenced for security with 6-foot chain link fencing topped with a 2-foot band of razor wire. Light colored lath would be incorporated into the chain link to reduce visual contrast.

Construction of well head sites would take up to four weeks and include concrete flatwork, well house construction, installation of electrical controls, and yard piping. A three-person drilling crew could complete a production well in about three weeks.

Pipelines

The Intermountain Water Supply pipeline route would begin in Dry Valley and traverse east across private and public land to the existing Tuscarora Gas Pipeline. At that point the pipeline would follow the Tuscarora Gas Pipeline southeast from Dry Valley into Bedell Flat. At a point along the Tuscarora Gas Pipeline in eastern Bedell Flat, the pipeline route would turn south to Antelope Valley. The pipeline would follow approximately 10 miles of Washoe County rights-of-way and then easements through Antelope Valley to Lemmon Valley, north of Reno-Stead Airport. The pipeline would then traverse Washoe County, BLM, and Airport Authority land to the pipeline terminus.

Intermountain Water Supply proposes to install a 16-inch diameter collection pipeline connecting wells DV-1 and DV-2 in Dry Valley. From DV-1 to the Project high point beyond the booster pump station in Bedell Flat, an 18-inch diameter line would be installed. A 12-inch diameter pipeline would extend from the Project high point to the terminus site in Lemmon Valley.

Pipe used to construct the Intermountain Water Supply pipeline would be one of the following types: steel pipe, high density polyethylene (HDPE) pipe, ductile iron pipe (DIP), or polyvinyl chloride (PVC) pipe. Two

basic types of installation are used for these types of pipe: welding and push-on. Steel and HDPE pipe are installed with a welding procedure. DIP and PVC are installed with a push-on procedure.

A terminal storage tank would be the responsibility of the water purveyor – Washoe County, Truckee Meadows Water Authority, or another private entity. Additional distribution system piping to allow connection to the existing distribution system located south of the Reno-Stead Airport would be provided by the water purveyor.

Pump Station

The pump station would be located on public land administered by BLM in Bedell Flat. Surface disturbance associated with construction of the station would be approximately 140 x 180 feet. A 6-foot chain link security fence with 2-feet of razor wire would enclose an area 100 x 140 feet. The pump station would include two 20,000-gallon water storage tanks approximately 20-feet wide by 10-feet high. A 750 hp diesel powered generator would initially be used to power the pump station. A 4,000-gallon double-walled aboveground storage tank would be used for storing diesel fuel. After installation of electrical distribution lines, diesel generators would be used for emergency backup power.

The pump station building would be about 20 x 30 feet and 10-feet high enclosing three vertical turbine pumps. The pump package would likely be pre-manufactured to include pumps, valves, and fittings mounted on a steel skid ready for installation and connection to suction and discharge piping. Construction of the pump station would likely take about 6 weeks.

Radio Telemetry Towers

A typical telemetry site would consist of a 20-inch solar panel and antenna mounted on a pair of steel posts set in concrete. The telemetry sites would have dimensions of about 10 x 10 feet and accessed by existing roads or helicopter. Locations of telemetry sites are shown on **Figure 2-1**.

Water Treatment

The Intermountain Water Pipeline would include chlorination of well water. The chlorination equipment would be housed at the booster pump station in Bedell Flat. Liquid sodium hypochlorite at nominal 12.5 percent solution strength would be used for disinfection. While the pumps are operating, sodium hypochlorite would be pumped by positive displacement metering pumps at a fixed rate into the discharge pipeline. The transmission pipeline would act as the chlorine contact chamber. At full build-out flow, travel time for the 2,200 gal/min flow is approximately 7 hours, 20 minutes. At a dosing rate of 2 milligrams per liter (mg/L) chlorine, up to 53 gal/day of 12.5 percent sodium hypochlorite solution would be required. To maintain adequate stocks of liquid sodium hypochlorite, two separate bulk storage tanks would be installed at the site. The tanks would be housed in a separate room inside the pump station. Initially, two 250-gallon bulk storage tanks would be used, expanding up to two 1,000-gallon storage tanks when the Project is completed.

Pipeline Construction

No construction activities would occur when surface conditions on the right-of-way or access roads are too wet to adequately support construction equipment. Fences crossing the right-of-way would be braced, cut, and temporarily fitted with gates to permit passage of construction traffic and survey monuments located within the right-of-way would be protected during construction activities.

Preparation of the right-of-way would include debris disposal, growth media salvage, and land leveling. Where present, 4 to 6 inches of surface materials would be separated and stored as growth media. Growth media and subsoil would be placed in separate stockpiles along side of the right-of-way for subsequent use in reclamation activities. The maximum width of disturbance along the pipeline route during construction would not exceed 80 feet.

The pipeline trench would be excavated using conventional backhoes or trenching machines. Where rock formations are encountered, tractor-mounted mechanical rippers or blasting would be necessary. A typical trench would be excavated to a depth of 72 inches with widths ranging from 32 to 40 inches.

State highways and other developed road crossings would be done using boring methods. Borings require excavation of a bell hole at either side of the crossing and auguring a horizontal hole under the roadway. Where necessary, a pipe casing would be inserted into the boring and the water pipeline placed within the casing.

Pipe segments would be placed adjacent to the trench and joints welded (steel) or heat butt fusion (HDPE) techniques applied to seal the joints. Once the pipe has been welded/fused and inspected, it would be lowered into the trench using side-boom tractors. For push-on pipe installation, each segment of push-on pipe would be lowered into the trench, where the plain end of one segment of pipe would be pushed into the spigot of another segment of pipe. A lubricated gasket in the pipe spigot would complete the seal.

Inspection during installation would verify minimum cover is provided, bottom of the trench is free of rocks and debris, external pipe coating (steel) is not damaged, and the pipe is properly fitted and placed in the trench. Pipe bedding material would consist of a 6-inch layer of pea gravel or compacted sand placed in the bottom of the trench. Bedding material would be placed around and above the pipe to a minimum thickness of 6-inches over the pipe. Backfilling the trench would occur after the pipeline has been placed in the trench and final inspection completed. Backfill would generally consist of material originally excavated. Subsoil would be placed first followed by redistribution of stockpiled growth media. Excess excavated materials would be properly disposed of in accordance with applicable regulations or jurisdictional agency requirements. When possible, excess excavated materials would be spread over the right-of-way to avoid off-site disposal.

The following measures would be implemented to reduce construction impacts in populated areas:

- Notify residents prior to commencement of construction operations.

- Use traffic control measures to minimize road access and traffic flow interruptions.

- Use temporary bridges to maintain access to residential and business areas.

- Use barricades or other appropriate traffic control devices when trenches are open at active construction sites.

- Water road surfaces and spoil storage areas to minimize fugitive dust.

- Avoid removing mature trees and landscaping within the construction work zone unless necessary for safe operation of equipment or installation of piping.

- Restore disturbed landscaping to pre-construction levels.

- Promptly repair any damage to private property caused by construction activities.

Two seven- to eight-person crews (one crew proceeding in each direction) would be used to construct and install the pipeline. Additional personnel would be used for surveying and staking the right-of-way, clearing and grubbing, dust control, reclamation, and testing.

After completion of construction, a permanent 20-foot wide right-of-way would be maintained for access and maintenance. The existing road associated with the Tuscarora Gas Pipeline would be used along the shared segment.

Blasting

Where rock formations are encountered and tractor-mounted mechanical rippers or rock trenching equipment not practical, blasting may be used. In areas where blasting is necessary the following safety precautions would be implemented:

- In areas of human use, blasting would be blanketed (matted).

- In advance, notify persons in close proximity to blasting areas to ensure livestock and property are protected.

- Before blasting, check the affected area to ensure personnel and equipment are out of the danger area.

- Station flagmen at safe distances to control traffic and protect the public where blasting would occur adjacent to public or private roads.

- Use cautionary measures to avoid damage to underground structures, cables, pipelines, springs, wells, or other water supplies.

- Avoid blasting in stream channels without prior consultation with appropriate jurisdictional agencies.

Stream Channel Crossings

Stream channel crossings would be constructed in accordance with the Nevada Temporary Permit Application for Working in Waterways, U.S. Army Corps of Engineers nationwide Permit requirements, and land management agencies. Environmental protection measures include the following:

- Use appropriate soil erosion and sediment

controls and maintain equipment in effective operating condition during construction. Exposed soil, as well as any work below the ordinary high water mark, would be permanently stabilized at the earliest practicable date. Efforts would be made to work during periods of low-flow or no-flow in drainages.

- Place mats on ground surface where heavy equipment would be working in wetlands, or use other measures to minimize soil disturbance.

- To the extent practicable, design activities so that preconstruction downstream flow conditions would be maintained. Do not allow activities to permanently restrict or impede passage of normal or expected high flow in drainage channels.

Fire Prevention

A designated Intermountain Water Supply representative in charge of fire control would be on-site during construction activities. Personnel affiliated with the Project would comply with all rules and regulations concerning use, prevention, and suppression of fires on public land administered by BLM. Fires resulting from construction activities would be immediately reported to BLM. In addition, the following fire prevention measures would be implemented:

- Have fire fighting tools and equipment available in the event of fire.

- Conduct welding or use of acetylene torches in an area cleared of flammable material.

- Assist each welder by using a helper equipped with a fire extinguisher and shovel to extinguish flames started by welding sparks.

- Do not store chemicals, fuels, and lubricants within 300 feet of a stream crossing.

- Transport gasoline, oil, and lubricants in approved containers in accordance with National Fire protection Association Code.

- Equip internal combustion engines with spark arresters, unless equipped with a turbine-driven exhaust supercharger; multi-position engine, such as on chainsaws; passenger vehicle or light truck equipped with a factory designed muffler and exhaust system in good working condition; or heavy truck used for hauling, equipped with a factory-designed muffler and vertical stack exhaust system extending above the cab.

Testing

The installed pipeline would be hydrostatically tested to ensure performance specifications are met. Hydrostatic testing would entail filling the pipe with water and maintaining a requisite pressure for a specified period of time. Hydrostatic tests would be conducted sequentially transferring test water from one segment to the next.

Hydrostatic tests are typically conducted with water containing dissolved chlorine or another sanitizer. A sample of sanitized solution would be withdrawn after testing to determine level of biological activity within the pipeline. Upon successful completion of a hydrostatic test and

water samples meet biological standards; the pipeline would be placed into service.

Corrosion Protection

Welded steel pipe would be protected from corrosion with external pipeline coating and cathodic protection. Cathodic protection includes placement of impressed current rectifiers and anode ground beds at various locations. Rectifiers would be located near power distribution lines and mounted on a pole adjacent to the right-of-way. Anodes would be buried in the pipe trench.

Proposed Resource Monitoring

Water Resources

The Nevada State Engineer would require Intermountain Water Supply to develop a plan to monitor potential impacts to groundwater resources in Dry Valley and Bedell Flat. Monitoring results would be submitted to the State Engineer on a periodic basis.

Intermountain Water Supply would implement one or more of the following monitoring and mitigation measures should modeling or monitoring of groundwater levels in Dry Valley (that occur from implementation of Project) identify conditions that impair the long-term yield of the aquifer:

- Install equipment to gage the actual amount of surface water flow in Dry Valley Creek and North Dry Valley Creek that flow from the upper portion of Dry Valley Basin to the lower portion of the Basin.
- Pump up to 1,000 af/yr from existing Intermountain Water Supply water rights in the upper portion of Dry Valley (e.g., Section 2, Township 24 North, Range 19 East) rather than pumping all water from the western part of Dry Valley. This water right is located in the eastern portion of the Dry Valley hydrographic basin and within the major geologic structural system that bisects the basin.
- Develop other wells in the eastern portion of lower Dry Valley to reduce the effect of drawdown at DV-1 and DV-2.
- If other existing Nevada water rights in Dry Valley are impacted by the Project, Intermountain Water Supply would implement actions to ensure the water right is provided. This could be addressed by deepening existing wells or piping Intermountain Water Supply water to the affected water right holder.

Employment

Approximately 60 workers would be employed during construction of the Intermountain Water Supply pipeline project including drilling crew, concrete flatwork, electricians, plumbers, pipe fitters, steel workers, equipment operators, carpenters, surveyors, and laborers. Construction and development are expected to require approximately 10 to 12 months.

The work schedule would include eight to ten hour shifts five days per week. Trenching, stringing, pipe installation, and backfilling would be conducted by a seven to eight person crew.

Most of the work force for the Project would come from the existing labor pool in the Reno-Sparks area.

During operation of the pipeline, workforce requirements would be in the areas of equipment performance and observation, preventative maintenance, normal repair work, and record keeping. This work would include monthly tours of the pipeline and weekly visits to the storage tank sites.

Reclamation

Reclamation activities on public land for the proposed Intermountain Water Supply Project would be designed to achieve post-construction land uses consistent with the Carson City Field Office Consolidated Resource Management Plan (BLM 2001a). Reclamation is intended to return disturbed land to a level of productivity comparable to pre-construction levels. Post-construction land use includes wildlife habitat, livestock grazing, and dispersed recreation.

Short-term reclamation goals would be to stabilize disturbed areas and protect adjacent undisturbed areas from unnecessary or undue degradation. Long-term reclamation goals would ensure public safety, stabilize the sites, and establish productive vegetative communities consistent with post-construction land use. As sections of the pipeline are completed Intermountain Water Supply would initiate reclamation activities concurrent with ongoing construction activities.

Prior to placing growth media, areas disturbed during construction of the Intermountain Water Supply pipeline would be graded to blend with surrounding topography. Regraded surfaces would be ripped where necessary prior to placement of growth media. Ripping would reduce compaction, provide a uniform seed bed, and help establish contact between the seed and soil. A BLM approved seed mix would be broadcast over disturbed areas and harrowed into the growth media.

ALTERNATIVES TO PROPOSED ACTIONS

This section describes alternatives to the Proposed Actions including the No Action Alternative, Alternatives Considered but Eliminated from Detailed Analysis, and the Agency Preferred Alternative. Alternatives selected by BLM for consideration in this EIS are based on potential impacts or issues associated with the Proposed Actions, including those identified by the public during the scoping process. BLM is required to analyze environmental effects resulting from the Proposed Actions and to identify reasonable alternatives that would mitigate or eliminate potential impacts from the Proposed Actions. BLM is also required to analyze the No Action Alternative and describe the environmental consequences that would result if the Proposed Actions are not implemented.

Major components of the proposed development, respective functions, and potential environmental effects resulting from implementation of these activities are considered in development of alternatives. Impacts that cannot be mitigated may require one or more alternatives. Other alternatives were considered early in the review process. These alternatives were eliminated because they were either technically or economically

infeasible or provided no environmental advantage over the Proposed Actions.

ALTERNATIVES CONSIDERED IN DETAIL

Alternatives to the Proposed Actions include: construction of water transmission pipelines using a common right-of-way; and the No Action Alternative.

Alternative A – Construct Pipelines within Common Right-of-Way

Alternative A would be comprised of all components of the Proposed Actions including installation of wells, collection pipelines, pump stations, surge tanks, a terminal tank (associated with Fish Spring Ranch's Proposed Action), diesel generators (associated with IWS Proposed Action), electrical distribution lines, and substation (for Fish Springs Ranch Proposed Action), but would require that both pipelines be constructed within a common right-of-way for a portion of the right-of-way (**Figure 2-8**). Alternative A would require that Fish Springs Ranch and Intermountain Water Supply construct their individual pipelines inside a common 130-foot-wide right-of-way extending from the point of intersection of the Intermountain Water Supply pipeline and Fish Springs Ranch pipeline in Dry Valley to a point in Antelope Valley where each pipeline diverges to their respective terminus sites. Alternative A would follow the proposed alignment of the Intermountain Water Supply pipeline. Total linear distance shared by the proposed Intermountain Water Supply pipeline corridor and Fish Springs Ranch corridor would be about 13.5 miles (2 miles in Dry Valley, 6.5 miles in Bedell Flat, and 5 miles in Antelope Valley).

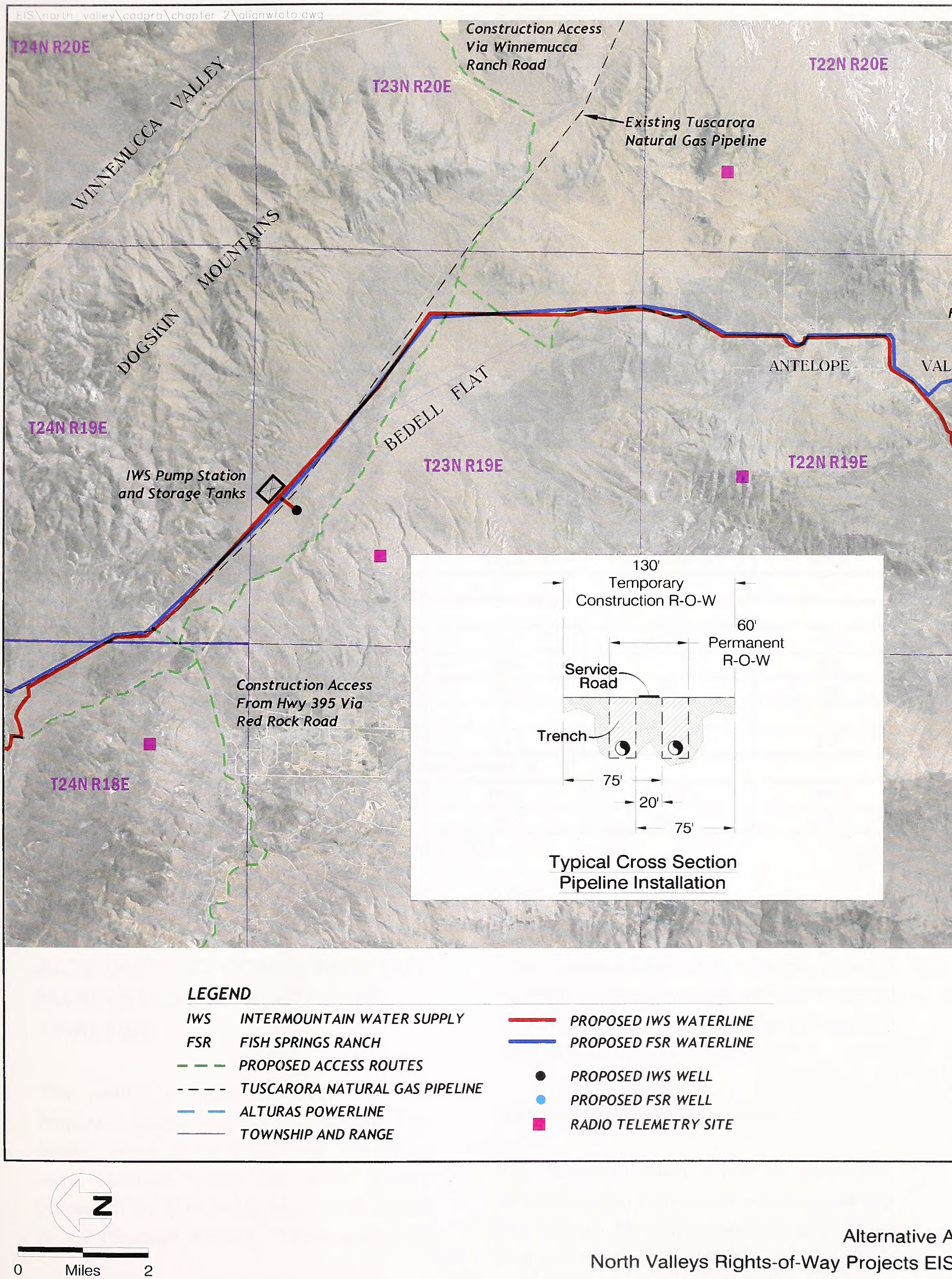
Alternative A would result in common permanent 60-foot-wide right-of-way with single access/service road (i.e., each pipeline would be located within a common 60-foot-wide right-of-way). Use of a common right-of-way would reduce surface disturbance by about 28 acres (**Table 2-1**).

No Action Alternative

Under the No Action Alternative, the Proposed Actions would not be constructed. Fish Springs Ranch and Intermountain Water Supply would not develop rights-of-ways across public land. Potential impacts predicted to result from development of the Projects would not be realized. Groundwater pumping in any of the basins could occur under approved permits.

SURFACE DISTURBANCE

Surface disturbance that would occur for each proposed Project component and ownership is presented in **Table 2-1**.



Alternative A
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 2-8

TABLE 2-1
Proposed Disturbance
Proposed Actions and Alternative A
North Valleys Water Projects

	Public Land (acres)	Private Land (acres)	Total Land (acres)
PROPOSED ACTION			
Fish Springs Ranch			
Well Development	-	18	18.0
Well Field Collection Pipelines	33.5	58.3	91.8
Electrical Substation	-	13.9	13.9
Pump Station	-	0.5	0.5
Pump Station Storage Tanks	-	1.1	1.1
Fort Sage Surge Tank	1	-	1
Pipeline Construction Right-of-way (75 foot width)	181.3	77.6	258.9
Equipment Staging Areas	5	.5	5.5
Terminal Storage Tank	4	-	4
Fish Springs Ranch Subtotal	**224.8**	**169.9**	**394.7**
Intermountain Water Supply			
Well Development	0.1	0.05	<1.0
Pump Station	0.6	-	0.6
Pipeline Construction Right-of-way (75 foot width)	127	91	218
Equipment Staging Areas	5	1	6
Intermountain Water Supply Subtotal	**132.7**	**92**	**225**
ALTERNATIVE A			
Fish Springs Ranch Pipeline Corridor	210.8	169.9	**380.7**
Intermountain Water Supply Pipeline Corridor	118.7	92	**210.7**

Source: Intermountain Water Supply 2004; Fish Springs Ranch 2004.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

This section describes alternatives to the Proposed Actions that were eliminated from further review in the EIS. These alternatives were identified during the public scoping process or by BLM during review and analysis of the Proposed Actions. These alternatives were considered technically infeasible, provided no environmental advantage over the Proposed Actions, or would not meet the purpose and need of the Proposed Actions.

Alternative Pipeline Routes

This alternative would include all components of the Proposed Actions and would require that Fish Springs Ranch and Intermountain Water Supply construct their individual water pipelines

across private land to the North Valleys delivery points. With the exception of a short segment of pipeline connecting well points in Bedell Flat to the Dry Valley well points, this alternative would eliminate construction of proposed pipelines across public land administered by BLM.

The pipeline routes included in this alternative would involve construction of pipelines from the Dry Valley well points and Honey Lake well array onto private land. These pipeline routes are shown on **Figure 2-9** and described below:

Fish Springs Ranch – East Honey Lake

The pipeline would connect the array of production wells at Fish Springs Ranch and would travel northward approximately two miles; the route would turn southwestward where it would intersect the northern end of Long Valley, California. The route would turn southeast and follow Long Valley and Long Valley Creek exiting the southern border of Lassen County, California and entering the northwest corner of Sierra County, California. The route would exit California heading northwesterly and connect to the proposed terminal tank included in Fish Springs Ranch's existing plan. Total distance of this pipeline route is approximately 62 miles. The pipeline route would cross private land and land administered by the State of California.

Intermountain Water Supply – Dry Valley and Bedell Flat

The pipeline would connect the well point in Bedell Flat to the well points in Dry Valley. The pipeline connecting Bedell Flat would cross approximately five miles of public land (administered by BLM) and two miles of private land. The pipeline route would exit from the Dry Valley well array to the west to a point where it intersects a point in Long Valley, California where it would join the previously described pipeline route for Fish Springs Ranch. Total estimated route length for the Intermountain Water Supply pipeline in this alternative is approximately 44 miles; all but 5 miles on private land or land administered by the State of California.

With the exception of groundwater production from the Bedell Flat wells, this alternative would eliminate the need for a right-of-way across public land administered by BLM. A right-of-way would be required across public land for the 5 mile segment connecting Bedell Flat wells to the Dry Valley pipeline system.

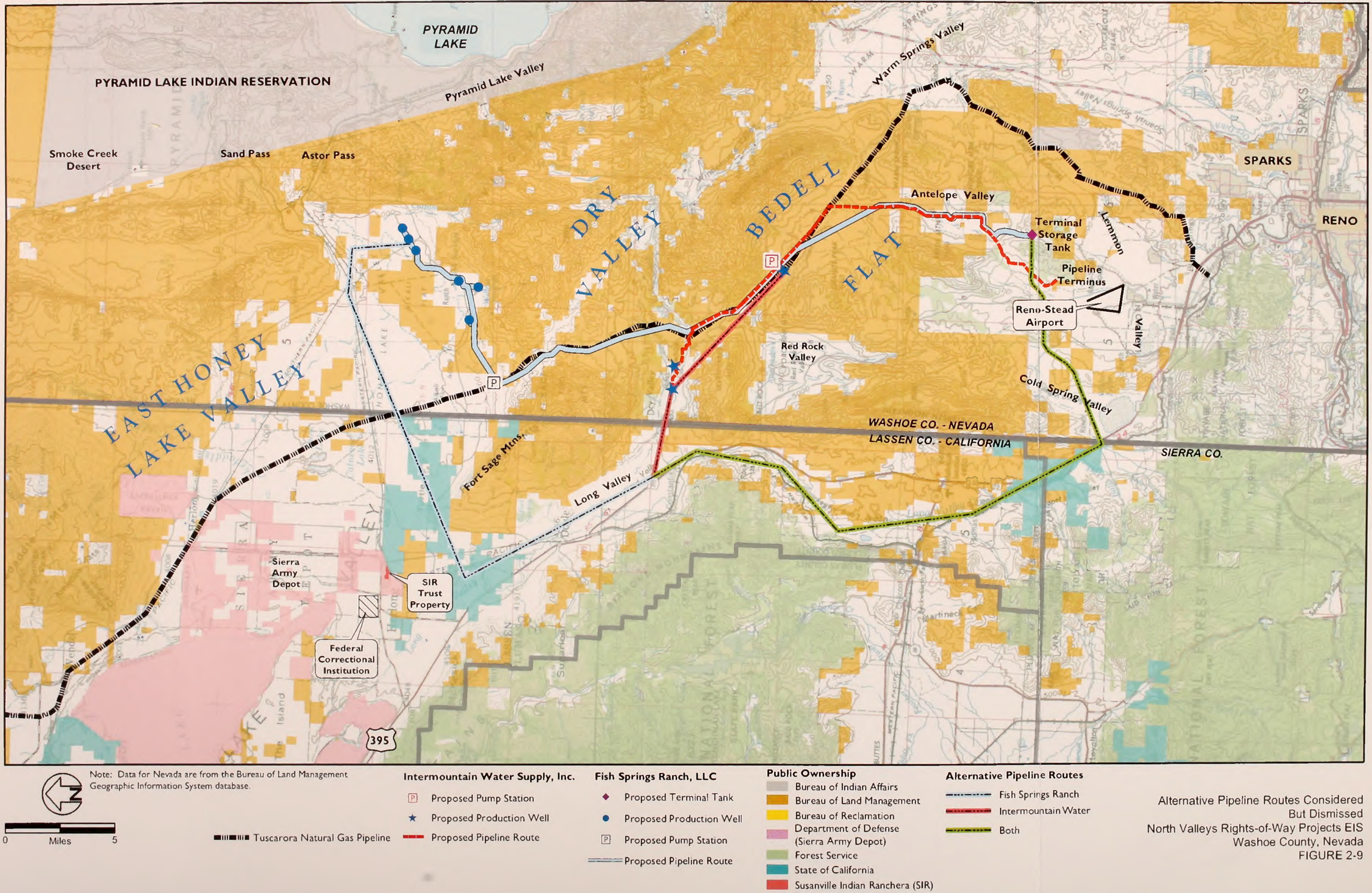
Rationale for Dismissing

This alternative was eliminated from further analysis in the EIS because it provides no advantage over the Proposed Action and would result in the need to construct approximately 36 additional miles of pipeline corridor as compared to the Proposed Action. In addition, production from the Bedell Flat well system would still require authorization of a right-of-way from BLM to allow water to be transported from this basin to the North Valleys Planning Area.

Construct Project Using a Single Pipeline and Fish Springs Ranch Terminal Storage Tank

Under the Proposed Actions, two pipelines generally would be constructed parallel with

EIS\north_valley\arcmap\draft_eis\fig3-1.mxd



Alternative Pipeline Routes Considered But Dismissed
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 2-9

one another from the point of intersection in Dry Valley to two separate terminal areas (2 miles in Dry Valley, 6 miles in Bedell Flat, and 5 miles in Antelope Valley) (**Figure 2-1**). Approximately 8 miles of this shared pipeline corridor would be constructed within the Tuscarora Gas Pipeline right-of-way in Dry Valley and Bedell Flat.

This alternative incorporates all components of the Proposed Actions, but would result in construction and installation of a single pipeline from the point of intersection of the Intermountain Water Supply pipeline and Fish Springs Ranch pipeline in Dry Valley to the Fish Springs Ranch pipeline terminal storage tank site on the divide between Antelope Valley and Lemmon Valley. The pipeline would be sized to deliver up to 11,500 af/yr. Construction of a single pipeline would result in less surface disturbance and potential re-disturbance of reclaimed portions of the shared right-of-way. Installation of a single pipeline would reduce the amount of construction and pipeline materials required. Potential construction conflicts would be avoided allowing timely completion of the project with minimal disruption to local traffic. A common storage tank terminus would further reduce overall surface disturbance and potential visual effects.

Particulate and gaseous emissions and noise generated during construction would be reduced. Additional construction jobs and resultant taxes would not be realized. Estimated cost to construct and reclaim approximately 20 miles of pipeline ranges from $5 to $5.5 million.

Although technically feasible, this alternative would require cooperation and agreement between Intermountain Water Supply and Fish Springs Ranch. BLM does not have authority to require the respective proponents to enter into such an agreement and, therefore, this alternative has been eliminated from further consideration.

Reroute Pipeline Right-of-Way through Antelope Valley

This alternative would require relocation of the pipelines approximately 1 mile east or west of the proposed route through Antelope Valley onto other private and public land. The western route would begin in the SE¼ of Section 11, Township 22 North, Range 19 East on Antelope Valley Road and proceed west approximately 1 mile, then south approximately 3 miles along the western part of Antelope Valley on public land administered by BLM to the point of intersection with the proposed route. The east route would begin in the SW¼ of Section 1, Township 22 North, Range 19 East, and proceed 5 miles south along the eastern portion of Antelope Valley through public and private land, then west for approximately 1.5 miles to rejoin the proposed route. These alternatives provided no environmental advantage over the Proposed Actions, which uses an existing county road right-of-way through Antelope Valley.

AGENCY PREFERRED ALTERNATIVE

The Agency preferred alternative is:

Alternative A – Construct Pipelines within Common Right-of-Way.

was another from the point of interconnection in Dry Valley to two separate terminal areas (2 miles in Dry Valley, 6 miles in [illegible] Flat, and 3 miles in Antelope Valley) (Figure 2-11). Approximately 3 miles of the shared pipeline corridors would be constructed within the [illegible] respectively, in Dry Valley and [illegible] Flat.

The alternative would consist of all components of the Proposed Actions and would result in construction and installation of a single pipeline from the point of interconnection of the Intermountain Water Supply pipeline and Tele Spring Ranch pipeline in Dry Valley to the Tele Spring Ranch storage terminal site on the divide between Antelope Valley and [illegible] Valley. The pipeline would be sized to deliver up to 11,500 [illegible]. Construction of a single pipeline would result in less surface disturbance and potential [illegible] of reclaimed portions of the [illegible]. Installation of a single pipeline would reduce the amount of construction and operating [illegible] required. Potential construction conflicts would be avoided allowing timely completion of the project with minimal disruption to local traffic. A common storage tank [illegible] would further reduce overall surface disturbance and potential visual effects.

Particulate and gaseous emissions and noise generated during construction would be reduced. Additional construction jobs and resultant taxes would also be reduced. Estimated cost to construct and install approximately 20 miles of pipeline ranges from [illegible] to [illegible] million.

Although technically feasible, this alternative would require suspension and agreement between Intermountain Water Supply and Tele Spring Ranch. [illegible] alternative has been eliminated from further consideration.

Eliminate Pipeline Right-of-Way Through Antelope Valley

This alternative would require relocation of the pipeline [illegible] of the proposed route through Antelope Valley onto urban [illegible] and [illegible] land. The western route would begin in the [illegible] Section 11, Township 22 North, Range [illegible] East [illegible] approximately [illegible] miles along the western side of Antelope Valley on public land [illegible] the point of [illegible] route. The [illegible] of Section [illegible], Township 22 North, Range [illegible] East, and proceed [illegible] along the eastern portion of Antelope Valley through public and private land for approximately 1.5 miles to reach the proposed [illegible] through Antelope Valley.

NO ACTION ALTERNATIVE

The No Action alternative [illegible]

[illegible] alternative [illegible] Construct Pipeline within Common Corridor [illegible]

CHAPTER 3

AFFECTED ENVIRONMENT FOR PROPOSED ACTIONS AND ALTERNATIVES

INTRODUCTION

The North Valleys Rights-of-Way Projects consists of two water transmission pipeline projects: 1) Fish Springs Ranch project to pump water from six wells at Fish Springs Ranch in eastern Honey Lake Valley in a pipeline extending 38 miles to a terminal storage tank located between Antelope Valley and Lemmon Valley; and 2) Intermountain Water Supply proposal to pump water from two wells in Dry Valley and one well in Bedell Flat in a 24-mile long pipeline to the terminus near Reno-Stead Airport in Lemmon Valley. Both project terminus sites are located approximately 15 miles north of Reno, Nevada (**Figure 3-1**).

The proposed Fish Springs Ranch pipeline right-of-way lies adjacent to the Tuscarora Gas Pipeline right-of-way southward from the pump station along the north flank of Fort Sage Mountains in eastern Honey Lake Valley, then into Dry Valley and Bedell Flat. In Bedell Flat, the Fish Springs Ranch pipeline corridor veers south away from the Tuscarora right-of-way into Antelope Valley and to a terminal storage tank between Antelope Valley and Lemmon Valley. The Intermountain Water Supply pipeline parallels the Fish Springs Ranch pipeline across portions of Dry Valley, Bedell Flat, and Antelope Valley before diverging south into Lemmon Valley to the pipeline terminus. The proposed pipeline corridors would cross public land administered by BLM. A detailed description of the Proposed Projects is in Chapter 2 of this Draft EIS.

This chapter provides a summary of environmental baseline information. In the following sections, "Projects Area" refers to the proposed pipeline rights-of-way (Proposed Actions) and associated components shown on **Figure 3-1**, as well as areas immediately surrounding these facilities. The "Study Area" is synonymous with Projects Area for some resources (soil and non-wetland vegetation), but is larger for most resources. The "area of potential effect" as used in the *Cultural Resources* section is synonymous with Projects Area. Study Areas for each environmental resource are based on predicted locations of direct and indirect impacts from the Proposed Actions and Alternatives.

Appendix 5 of BLM's NEPA Handbook (H-1740-1) identifies Critical Elements of the Human Environment. The appendix is a list of elements of the human environment that are subject to requirements specified in statutes or executive orders and must be considered in all BLM

environmental documents. The Critical Elements are:

- Air Quality
- Areas of Critical Environmental Concern (ACEC)
- Cultural Resources
- Environmental Justice
- Farm Land (prime or unique)
- Floodplains
- Invasive, Non-native Species
- Native American Religious Concerns
- Threatened, Endangered, Candidate, and Special Status Species
- Migratory Birds
- Water Quality (drinking water/groundwater)
- Wetlands/Riparian Zones
- Wild and Scenic River
- Wilderness

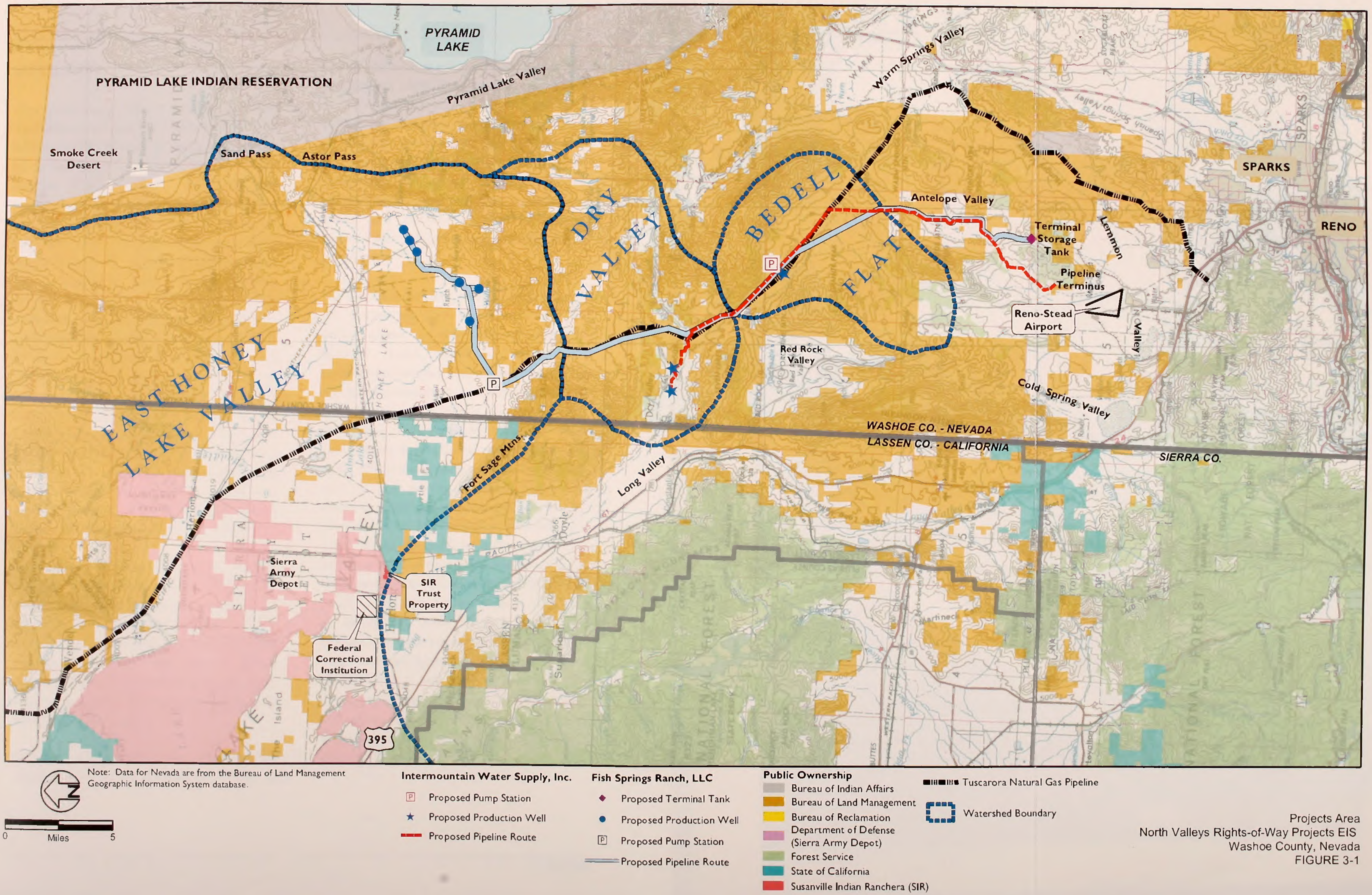
The following Critical Elements of the Human Environment have been analyzed by BLM and would not be affected by the Proposed Actions or Alternatives, or are not present in the Projects Area:

- Areas of Critical Environmental Concern
- Wastes (hazardous or solid)
- Floodplains
- Wild Horses and Burros
- Wild and Scenic Rivers
- Wilderness
- Farm Land (prime or unique)

GEOLOGY, MINERALS AND PALEONTOLOGY

PHYSIOGRAPHIC LOCATION

The Projects Area is located within the Basin and Range Physiographic Province, which contains elongate north and northwest trending mountain ranges of moderate to high relief (elevation 6,000 to 8,000 feet above mean sea level (amsl)) that alternate with, and are separated by colluvial and alluvial sediment filled basins (elevation 4,000 to 6,000 feet amsl). Many basins in the area contain playa lakes including Honey Lake at the north end of the proposed Fish Springs Ranch water pipeline (**Figure 3-1**). Playa lakes are generally located in central portions of closed basins in arid and semi-arid environments, whose water levels vary considerably as a function of precipitation and evaporation. The basins may contain areas of evaporite (alkali-salts) sedimentary deposits deposited on flat lacustrine valley floors.



Projects Area
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 3-1

GEOLOGY

Geologically young rocks of Tertiary age (65 to 1.8 million years ago) and Quaternary age (1.8 million to 8,000 years ago) outcrop across most of the Study Area in southern Washoe County (**Figure 3-2**). Tertiary rock units are comprised predominantly of volcanic rocks that occur as interbedded lava flows, ash flows, ash falls, and pyroclastic rocks that range from basaltic to rhyolitic. Locally, sedimentary rocks are interlayered with volcanics. Volcanic units include the Hartford Hill Rhyolite, Alta Formation, and Pyramid sequence (Bonham 1969). Brief descriptions of these geologic units are presented in **Table 3-1**. Quaternary units are predominantly poorly consolidated to unconsolidated alluvial, colluvial, and lacustrine (lake bed) sediment. In the vicinity of the proposed pipelines, these units include pre-Lahontan deposits of sand and gravel deposited as alluvial fans, terraces, and pediments; and younger Quaternary alluvium and colluvium deposits (Bonham 1969). Over 1,000 feet of sediment fill many valleys in the Study Area.

In southern Washoe County, pre-Tertiary rocks of Triassic and Jurassic age (248 to 145 million years ago) consist predominantly of metamorphosed (thermally altered) volcanic rocks of the Peavine Sequence (Bonham 1969). Younger Cretaceous age granitic stocks (biotite-hornblende granodiorite) intrude these metamorphic rocks and have been dated at 92 to 88 million years ago.

Structural geology of the area indicates two principal periods of deformation: one of Jurassic age, and the other of Miocene to recent age (Bonham 1969). The Jurassic age event (213 to 145 million years ago) consisted of folding, faulting, and low-grade thermal metamorphism of Triassic and Jurassic age volcanic and sedimentary rocks. Emplacement of numerous Cretaceous age granitic and granodioritic intrusive bodies followed these deformational events and resulted in contact thermal metamorphic haloes around intrusive stocks and plutons.

The second major deformational event began in the Miocene age (23.8 million years ago), and waning phases of this orogenic (mountain building) event continue today. This deformation includes the normal faulting (up and down movement along steeply dipping fault planes), and wrench-faulting (also called strike-slip faulting, with principally lateral movement along steeply dipping faults) responsible for the uplift, tilting, and folding of sedimentary rock units of the existing mountain ranges and volcanism associated with the mountain building event. The Walker-Lane fault or shear zone is a major strike-slip fault structure that trends northwest to southeast in the southern third of Washoe County. The amount of right lateral offset on this fault appears to be on the order of 80 to 120 miles (Bonham 1969). The Walker-Lane fault extends from the southern edge of Honey Lake Basin southeast between the Fort Sage and Virginia Mountains and continuing southeast through the Winnemucca and Warm Springs Valleys about 6 miles northeast of the proposed pipeline in the Bedell Flat area (**Figure 3-2**).

TABLE 3-1
Simplified Stratigraphic Section of North Valleys Projects Area

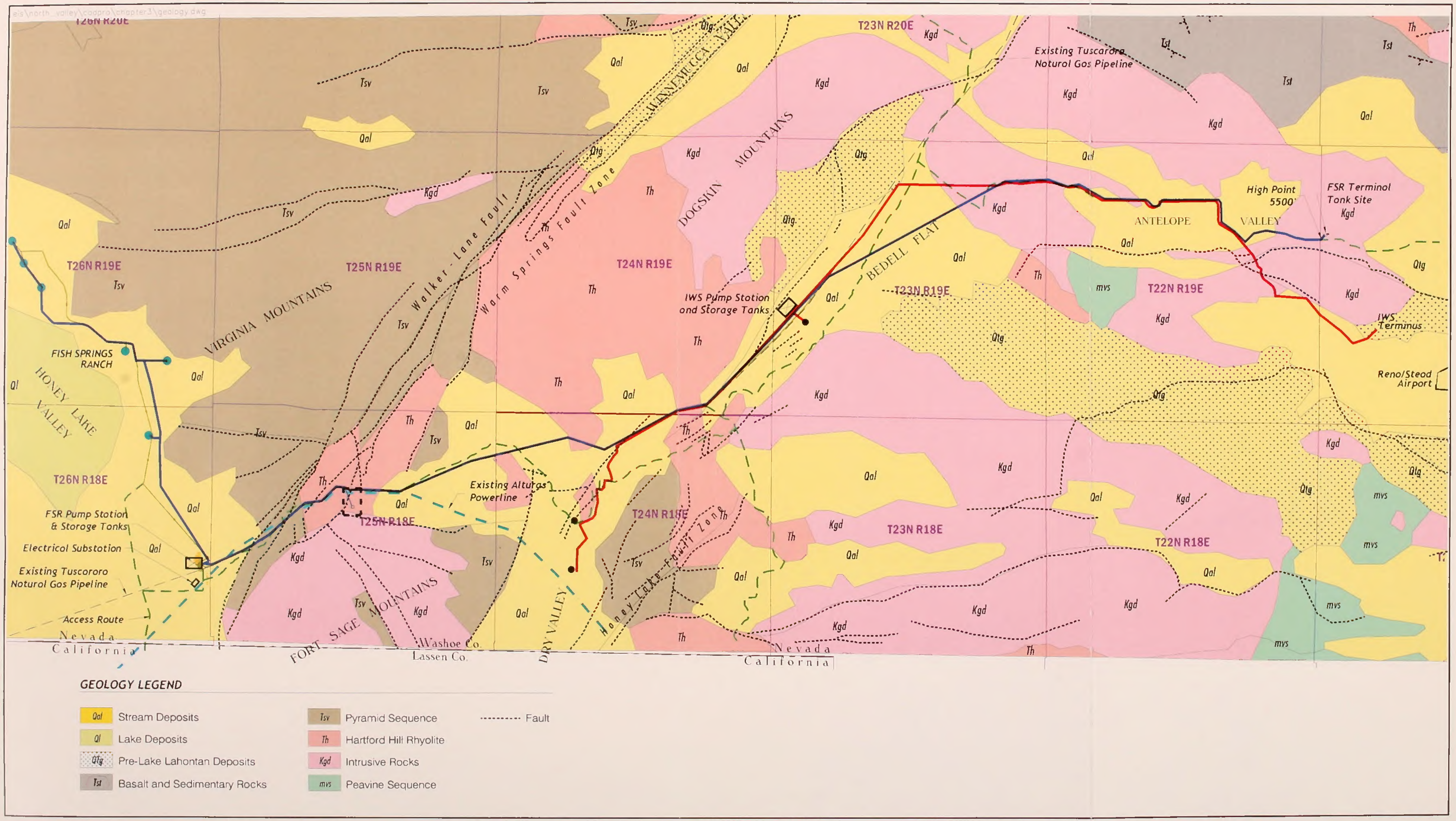
System	Million Years Ago	Formation	Description[1]
Quaternary	1.8 to present	Quaternary Alluvium (Qal)[2]	Stream deposits, talus and slope wash alluvial and colluvial deposits
Pleistocene	1.8 million to 8000 years	Pre-Lake Lahontan Deposits (QTg)[2]	Terrace, alluvial fan and pediment gravels
Pliocene	5.3 to 1.8	Pliocene Sedimentary Rock (Tst)[2]	Fluvial and lacustrine sedimentary rock, arkose, sandstone, siltstone, mudstone and shale.
Miocene	23.8 to 5.3	Pyramid Sequence (Tsv)[2]	Volcanic basalt, andesite flows, breccias and agglomerates, minor sedimentary rocks
Miocene	23.8 to 5.3	Alta Formation (Ta)[2]	Predominantly andesitic volcanic flows, breccias and pyroclastic rocks with minor sedimentary phases
Oligocene	33.7 to 23.8	Hartford Hill Rhyolite (Th)[2]	Predominantly volcanic ash flow tuff, with minor ash fall tuff and clastic sedimentary rocks
Erosional Unconformity			
Cretaceous	145 to 65	Intrusive Rocks (Kgd)[2]	Undifferentiated intrusive rock ranging from gabbro to granite in composition, with quartz monzonites being most common
Triassic/ Jurassic	145 to 248	Peavine Sequence, Metavolcanic Member (mv)[2]	Thermally metamorphosed volcanic rock consisting of flows, and pyroclastic rocks ranging in composition from basaltic to rhyolitic

1 Rock descriptions modified from Bonham (1969).
2 Geologic map symbol.

There is evidence to suggest that Bedell Flat and the area southwest of Dogskin Mountain lie on a system of faults parallel to and within a zone that may be part of the overall Walker-Lane fault system or shear zone. Subsequent vertical displacement along range bounding faults along the west side of the Virginia Mountains indicates that Mesozoic basement rock is depressed by some 4,000 feet below that of adjacent ranges to the west across the Walker-Lane fault (Gimlett 1967). In addition, depth of valley fill in Warm Springs Valley ranges from 1,920 to 3,380 feet amsl (Gimlett 1967).

AREA SEISMICITY

Southern Washoe County occurs within the Sierra Nevada-Great Basin Seismic Belt and contains earthquakes that occur along the eastern side of the Sierra Nevada. This belt is characterized by "persistently high levels of earthquake activity" (dePollo and dePollo 1999). The Uniform Building Code considers this area in Seismic Risk Zone 4 for construction purposes (UBC 2000).



N

Not to Scale

MAP LEGEND

IWS INTERMOUNTAIN WATER SUPPLY
FSR FISH SPRINGS RANCH
PROPOSED ACCESS ROUTES
TUSCARORA NATURAL GAS PIPELINE
ALTURAS POWERLINE
TOWNSHIP AND RANGE
PROPOSED IWS WATERLINE
PROPOSED FSR WATERLINE
PROPOSED IWS WELL
PROPOSED FSR WELL

Geologic Map of the North Valleys Projects Area
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 3-2

The U.S. Geological Survey's (USGS) Seismic Hazards Database tabulates historical records of earthquakes from about 1850 to present (USGS 2004a). Records of earthquakes occurring after 1973 typically identify the magnitude and epicenter of the earthquake from measurements observed from a network of seismic stations. Earthquakes before that time may have been identified by a number of various methods including observations of the earthquakes effects. In either case, the overall historical earthquake record (150 years) is too short to be an effective indictor of past or future earthquake activity.

Searches conducted on the USGS database for earthquakes occurring within 200 kilometers of the center of the proposed pipelines identified 345 earthquakes of a magnitude greater than 3.5 since 1973. In addition, these records identify 119 earthquakes of a magnitude greater than 5.0 (modified Richter scale), including 18 earthquakes greater than 6.0, and 2 earthquakes greater than 7.0 since 1850. The largest earthquake recorded in this area was a magnitude 7.26 in 1954 located 169 kilometers (km) east of the Projects Area, southwest of Pyramid Lake and the town of Nixon, Nevada.

The USGS also has a Quaternary Fault Database system (USGS 2004b) that tabulates and describes fault systems with active movement within the Quaternary Period (1.8 million years ago to present). These faults have been identified based on field evidence (i.e., fault scarps; geomorphic evidence of Holocene displacement; offset of Pleistocene shoreline and alluvial fan features, lineaments). Three fault systems within the Study Area are recognized as having had movement in the Quaternary period and lie in close proximity to, or along, the proposed pipeline rights-of-way:

1) Honey Lake fault zone, which exhibits right lateral strike-slip, range front faults bounding the southwestern flank of Dogskin Mountains and Fort Sage Mountains, through the Seven Lakes Mountains, and inter-basinal faults in the Bedell Flat and Dry Valley areas.

2) Warm Springs Valley fault zone exhibits as much as 5.5 km of right lateral offset of geologic unit on either side of the Warm Springs Valley and interbasinal faults within the valley.

3) Fred Mountain Fault system has range front faults on the east side of Freds Mountain and an unnamed mountain block to the south (near southern terminus of proposed water transmission pipeline corridors).

The 1994 EIS (FERC/CSLC 1994) for the Tuscarora Gas Pipeline (which runs adjacent to the proposed pipeline rights-of-way over part of its length) identified two fault systems in southern Honey Lake Valley (Honey Lake and Fort Sage Mountain fault zones). Estimated maxim credible earthquake potential and acceleration from these fault zones are 7.3 and 0.36g, and 6.0 and 0.31g, respectively.

PALEONTOLOGICAL RESOURCES

The large intrusive and volcanic component of lithologies in southern Washoe County to a large extent precludes the presence of fossils. However, a few sparse fossils have been found

within scattered sedimentary interbeds within volcanic sequences and in metamorphosed basement rock. Significant fossil resources are generally considered to be vertebrate fossils. No significant paleontological resources have been identified within the Study Area.

An ammonite has been found in sedimentary rocks associated with metamorphosed Triassic basement rock (Bonham 1969). In addition, sedimentary units of the Alta Formation and Pyramid Sequence locally contain flora of Miocene and Miocene/Pliocene ages, respectively.

Exposures in Mesozoic and Cenozoic stratigraphic units and paleontological resources identified to date from strata of southern Washoe County are similar to those found commonly elsewhere in Nevada and are not considered unusual or unique. In addition, most construction of the water transmission pipelines would occur within recent valley fill sediments.

AIR RESOURCES

SITE CLIMATOLOGY

Climatology of the Study Area (entire area depicted on **Figure 3-1**) is represented by meteorological and precipitation data collected at the Reno-Tahoe International Airport. The National Climatic Data Center (NCDC), previously the National Weather Service, has collected meteorological data at the Reno airport since 1937. Temperatures at the Reno-Tahoe airport are warmest in July and August, and coolest in December and January. Mean annual precipitation at Reno during the period of record was 7.48 inches. Precipitation is highest in January and February and lowest from March to October. **Table 3-2** is a summary of temperature and precipitation data for the period of record from 1971 to 2000.

In addition to temperature and precipitation, NCDC collects wind speed and direction data at the Reno airport. Wind patterns in the Study Area are predominately from the west, with some easterly influence as well.

AIR QUALITY

The State of Nevada and federal government have established ambient air quality standards for criteria air pollutants. The criteria pollutants are carbon monoxide (CO), lead (Pb), sulfur dioxide (SO_2), particulate matter smaller than 10 microns (PM_{10}), ozone (O_3), and nitrogen dioxide (NO_2). National Ambient Air Quality Standards (NAAQS) have also been adopted for particulate matter smaller than 2.5 microns ($PM_{2.5}$)

Ambient air quality standards must not be exceeded in areas where the general public has access. National primary standards are the levels of air quality necessary, with an adequate margin of safety, to protect the public health. National secondary standards are the levels of air quality necessary to protect the public welfare from known or anticipated adverse effects of a regulated air pollutant.

TABLE 3-2
Temperature and Precipitation Data from Reno-Tahoe International Airport
1971 – 2000

Parameter	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Ann. Avg.
Temperature (degrees F)													
Average Maximum	45.5	51.7	57.2	64.1	72.6	82.5	91.2	89.9	81.7	69.9	55.3	46.4	67.4
Average Minimum	25.7	30.8	38.3	40.2	48.7	59.8	67.1	62.5	56.3	46.5	35.1	25.4	25.4
Total Precipitation (inches)													
Mean Monthly Precipitation	1.06	1.06	0.86	0.35	0.62	0.47	0.24	0.27	0.45	0.42	0.80	0.88	7.48
Highest Monthly Precipitation	3.32	4.84	2.87	1.35	2.38	1.53	1.06	1.03	2.31	1.65	3.08	3.03	---
Year Highest Monthly Precipitation Occurred	1997	1986	1995	1983	1971	1989	1971	1975	1982	1982	1983	1996	---
Lowest Monthly Precipitation	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	---
Year Lowest Monthly Precipitation Occurred	1991	1988	1988	1985	1985	1994	2000	1998	1995	1995	1999	1989	---

Source: Western Regional Climatic Center 2004.

The 1- and 8-hour CO standards and the 3- and 24-hour SO_2 standards must not be exceeded more than once per year. The PM_{10} 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above the standard, rounded to the nearest 10 micrograms per cubic meter (μg/m³), is equal to or less than 1 day (NAC 445B.22097). Monitored or expected annual average levels of PM_{10}, NO_2, and SO_2 must not be exceeded in any year. Compliance with the 8-hour ozone and $PM_{2.5}$ standards is based on 3-year averages, as explained in EPA regulations. The 1-hour ozone NAAQS will no longer apply to an area one year after the effective date of designation of that area for the 8-hour ozone NAAQS. The effective designation date for most areas is June 15, 2004 (EPA 2004).

Attainment status within the Study Area is determined by monitoring ambient levels of criteria pollutants. Air quality in most of Washoe County is classified as attainment or unclassified for all pollutants. The attainment or unclassified designation means that no violations of Nevada or national air quality standards have been documented in the region.

Washoe County is designated as non-attainment area for CO. Portions of Washoe County are designated as non-attainment areas for ozone (1-hour standard) and PM_{10}. This designation means that exceedances of the applicable ambient air quality standards have been measured in the area.

PSD CLASSIFICATION

The area surrounding the Projects Area is a designated Class II area as defined by the

Federal Prevention of Significant Deterioration (PSD) of Air Quality program. The PSD Class II designation allows for moderate growth or degradation of air quality within certain limits above baseline air quality. Industrial sources proposing construction or modifications must demonstrate that proposed emissions would not cause significant deterioration of air quality in all areas.

Standards for significant deterioration are more stringent for Class I areas than Class II areas. The Class I area nearest to the Proposed Projects is the U.S. Forest Service Desolation Wilderness Areas in California. Desolation Wilderness Area is located approximately 50 miles southwest of the Projects Area. Air quality related values are protected in Class I areas as well as ambient air quality.

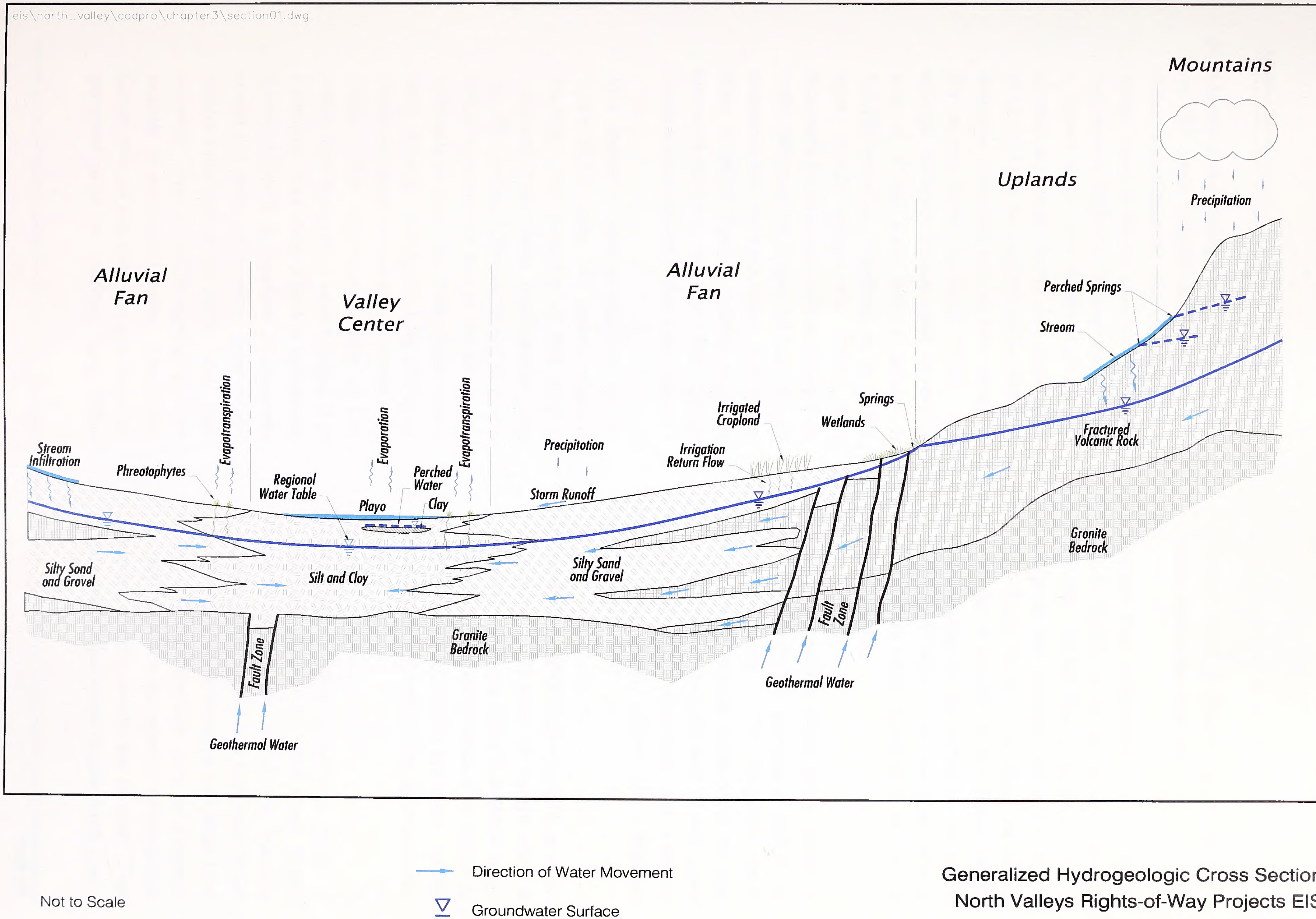
EXISTING EMISSION SOURCES

Existing sources of emission within the Projects Area include diesel-generator sets used to pump water from wells associated with Fish Spring Ranch's irrigation system and supply general ranch operations. Five diesel engine driven pumps are used to pump water from irrigation wells and two ranch generators are used to supply electrical power for general ranch operations. Diesel engine powered generators used to pump well water range from 230 to 450 hp and the general ranch diesel-generators are 100 hp each. Diesel-generator sets associated with irrigation wells are operated seasonally during the irrigation season. Estimated NOx (oxides of nitrogen) emissions from these diesel-powered generator sets range from 17 to 304 pounds per day (lbs/day), totaling nearly 1,000 lbs/day during the irrigation season. General ranch generator emissions are estimated at 42 lbs/day NOx, for a combined emission of approximately 84 lbs/day.

WATER RESOURCES

This section describes surface water and groundwater resources in the North Valleys Study Area which consists of the eastern Honey Lake Valley, Dry Valley, and Bedell Flat watersheds, and portions of Antelope Valley, Lemmon Valley, Smoke Creek Desert, and Pyramid Lake Valley (**Figure 3-1**). The proposed pumping wells would be located in eastern Honey Lake Valley for Fish Springs Ranch, and west-central Dry Valley and northwestern Bedell Flat for Intermountain Water Supply. The water transmission pipelines would extend south from these valleys into portions of Antelope Valley and Lemmon Valley. Part of Honey Lake Valley and Dry Valley extend west into California. Pyramid Lake is located 5 to 10 miles east of the Projects Area in Nevada.

The Study Area is characterized by fault-block mountain ranges separated by broad basins filled with sediment. **Figure 3-3** is a generalized cross-section showing features of a typical basin and range hydrologic system. The mountains are composed primarily of granite and overlying volcanic rocks. The granite is relatively impermeable to groundwater movement, while many of the volcanic rocks are fractured and have greater capacity to transmit groundwater in secondary openings.



Not to Scale

Generalized Hydrogeologic Cross Section
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 3-3

- **Honey Lake Valley** – Hydrographic area no. 97 totals 123,520 acres (193 square miles) within Nevada. An additional 2,000 square miles of Honey Lake Valley extends into eastern California. Honey Lake Valley is a closed basin, with Honey Lake as the primary playa water body. The surface area of Honey Lake, located entirely in California, fluctuates seasonally and has been observed dry several times (Rockwell 1990). On average, however, Honey Lake covers an area of 47,000 acres with a volume of 120,000 acre-feet (Handman *et al.* 1990). Most surface water that drains from mountains in the eastern side of Honey Lake Valley infiltrates into alluvial fan and valley fill sediments near the basin edges. Fish Springs playa in Alkali Flats is located near the proposed pumping wells for Fish Springs Ranch in southeastern Honey Lake Valley.

- **Dry Valley** – Hydrographic area no. 95 totals 51,200 acres (80 square miles) in Nevada. For purposes of this project, Newcomb Lake Valley (hydrographic area no. 96 totaling 5,760 acres or 9 square miles) is considered part of the Dry Valley hydrographic area. Dry Valley Creek drains west through Nevada to Long Valley in California, which then drains to Honey Lake Valley. The western-most side of Dry Valley (approximately 3 square miles) is in California. Dry Valley Creek is ephemeral, flowing primarily in response to snowmelt runoff and major rain events. Some of the tributary channels of Dry Valley Creek have perennial reaches where springs provide sources of year-round water. Dry Valley Creek west of the state line also becomes perennial prior to reaching Long Valley Creek, which is located approximately 4 miles west of the state line.

- **Bedell Flat** – Hydrographic area no. 94 totals 33,920 acres (53 square miles) in Nevada. Bedell Flat is situated north of Antelope and Lemmon Valleys and east of Red Rock Valley. A minor ephemeral drainage is located in the center of the basin, exiting in the northwest corner to Red Rock Valley. No perennial streams exist in the basin, and there is no playa in the valley floor.

The three watersheds listed above would be subject to groundwater pumping as part of the Proposed Actions. The proposed water pipelines would extend north-south through these three watersheds, as well as two other hydrographic areas (Antelope and Lemmon Valleys) contained within the Western Hydrographic Basin:

- **Antelope Valley** – Hydrographic area no. 93 totals 11,520 acres (18 square miles) in Nevada. Antelope Valley is a closed basin. No perennial surface water flow occurs in Antelope Valley, except for short reaches near a few small springs that discharge year-round.

- **Lemmon Valley** (eastern part) – Hydrographic area no. 92B totals 25,600 acres (40 square miles) in Nevada. Lemmon Valley is a closed basin with runoff terminating at the Lemmon and Silver Lake playas. The northern part of Lemmon Valley is where the pipeline terminus and storage tank(s) would be located. No perennial surface water occurs in this area.

The Western Hydrographic Region of Nevada covers 385,280 acres (602 square miles) and is contained in Washoe County. Surface water in this region generally drains west through western Nevada into eastern California, or drains internally into closed basins. A large portion of Honey Lake Valley is located in California, and a small part of Dry Valley extends into California. The other hydrographic areas (Bedell Flat, Antelope Valley, and Lemmon Valley) are located entirely within Nevada. Most surface water from the Western Hydrographic Region has potential to flow into Honey Lake, a closed-basin playa in the California side of Honey Lake Valley.

In general, perennial reaches of some streams (e.g., Cottonwood Creek located about 3 miles east of Fish Springs Ranch headquarters, and Fish Springs Creek located about 4 miles west of Fish Springs Ranch headquarters) are located in the mountainous areas where discharge from springs provides year-round water. Other stream reaches flow only in response to runoff from snowmelt and high-intensity rain storms. In general, stream flow: 1) is subject to evapotranspiration along the channels; 2) reaches a playa in the valley floor; and/or 3) percolates to become groundwater recharge. Most surface water that drains from surrounding mountains evapotranspirates or infiltrates prior to reaching valley floors.

Mean annual stream flow for Cottonwood Creek is estimated at 2.2 cubic feet per second (ft^3/sec) or 1,000 gallons per minute (gal/min) for a drainage area of 14.6 square miles (Rockwell 1990). For Fish Springs Creek, mean annual flow is about 0.43 ft^3/sec (200 gal/min) for a drainage area of 3.7 square miles (Rockwell 1990).

Streamflow observations and measurements collected by the USGS (Berger *et al.* 2004) from Dry Valley Creek about 1 mile west of the state line show that flow began near the end of October 2002 and ceased by early May 2003. During this period, average flow rate was less than 0.5 ft^3/sec (225 gal/min) (Berger *et al.* 2004).

SURFACE WATER QUALITY

Quality of surface water has been characterized by a limited number of samples collected from stream segments in the Study Area. Salinity and alkalinity of surface water generally are low to moderate, except near the playas where they are high (Rockwell 1990). Samples collected in February 1988 from Cottonwood Creek and Fish Springs Creek in southeastern Honey Lake Valley show these streams to be calcium-bicarbonate type with total dissolved solids (TDS) concentrations of 147 and 169 milligrams per liter (mg/L) (Rockwell 1990).

According to Handman *et al.* (1990), calcium, sodium, and bicarbonate are the predominant ions in streams in eastern Honey Lake Valley. In the central part of the basin, sodium, chloride, and TDS are higher.

A water sample collected from lower Dry Valley Creek in April 2000 shows a TDS of 322 mg/L and pH of 8.9 standard units (Stantec Consulting and Cordilleran Hydrology 2000). The water is a sodium-calcium bicarbonate type, with low concentrations of other ions and metals.

SPRINGS

Numerous springs have been identified in the Study Area. In 1989 and 1990, JBR Consultants Group (1990a, 1990b) conducted spring and seep inventories in Honey Lake Valley, Dry Valley, and the northern part of Bedell Flat. The inventories included information about flow rate, water quality (pH, conductivity, temperature), water usage, and geologic and vegetation characteristics. Results of these inventories are also summarized in the Draft EIS for Bedell Flat Pipeline Right-of-Way (BLM 1993). Another inventory of springs was completed by WESTECH Environmental Services (Westech 2004a) in summer 2004, focusing on the areas of potential groundwater drawdown that could result from proposed pumping in Honey Lake Valley, Dry Valley, and Bedell Flat. Springs in the Study Area identified from the 2004 inventory are shown on **Figure 3-4** and listed in **Table A-1** of **Appendix A**.

During the 1989 inventory by JBR (1990a), approximately 140 springs, seeps, and flowing wells were identified in the Study Area. For the 1990 inventory, JBR (1990b) identified an additional 23 springs and 18 flowing wells. Approximately 60 percent of the 1989 springs and 50 percent of the 1990 springs had flow rates of less than 1 gallon per minute (gal/min). Only 17 springs inventoried in 1989, and four springs inventoried in 1990, had flows >5 gal/min, most of which were located in Cottonwood Creek drainage on the southeast side of Honey Lake Valley. Some of these springs discharge at rates of 30 to 40 gal/min. Inventoried wells were flowing at rates ranging from 1 to 145 gal/min (JBR 1990b).

The Fish Springs complex located near Fish Spring Ranch currently is dry, but previously flowed at about 1,600 gal/min prior to significant irrigation pumping (Rush and Glancy 1967). In the 1960s when an irrigation well near Fish Springs was pumping 2,000 gal/min for an average of 90 days each year, the flow from Fish Springs declined to about 400 gal/min (Rush and Glancy 1967). High Rock Spring in northern Honey Lake Valley was discharging approximately 800 gal/min in 1989. According to the JBR (1990a), all springs with flows >5 gal/min issued near basalt of the Pyramid Sequence.

In 2004, a total of 58 springs were identified by Westech (2004a) within the areas of potential groundwater drawdown resulting from the Proposed Actions. Of these springs, 29 are in Honey Lake Valley, 10 in Dry Valley, and 19 in Bedell Flat (**Figure 3-4**). Flowing wells were included in the spring inventory by Westech (2004a). No springs have been identified along the pipeline rights-of-way in Antelope and Lemmon valleys.

The extent that water flows downstream from each spring source varies considerably. Many of the springs surface in the drainage bottom and flow only a short distance before infiltrating back into the ground. Other springs have flow that continues farther downstream and often combine with flow from other springs to form perennial reaches of stream flow. At some locations, heavy livestock use causes the water to spread over a relatively large area, thereby limiting downstream flow.

Most springs identified in the Study Area are located in upland areas where recharge occurs from direct precipitation (snow and rain) in the mountains. Where infiltrated water collects in shallow fracture zones and/or atop less permeable rock layers, discharge can occur as mountain springs (**Figure 3-3**). Some springs occur where the water table intercepts ground surface, often at a significant break in slope. Other springs discharge from deeper groundwater flow systems via major fracture/fault zones, some of which are geothermal (**Figure 3-3**). Little direct evidence of geologic structure could be discerned during the field surveys.

Quality of water for most springs in the Study Area was similar, especially those located in upland areas. Based on quality data collected during the 1989 JBR survey, electrical conductivity (EC) typically was in the range of 200 to 450 micromhos per centimeter (µmhos/cm), and pH values usually were from 7.0 to 7.9 standard units. Temperature for most springs varied from about 10 to 20 degrees Celsius (˚C); however, some springs were below 5 ˚C or above 25 ˚C. Some samples collected by JBR in 1989 were submitted for laboratory analysis of TDS, common ions, and iron. These data show that TDS is in the general range of 100 to 400 mg/L. Sodium and calcium are the dominant cations, and bicarbonate is the dominant anion. Chloride and sulfate concentrations are elevated for some springs (>100 mg/L). Iron concentrations are low for all spring samples.

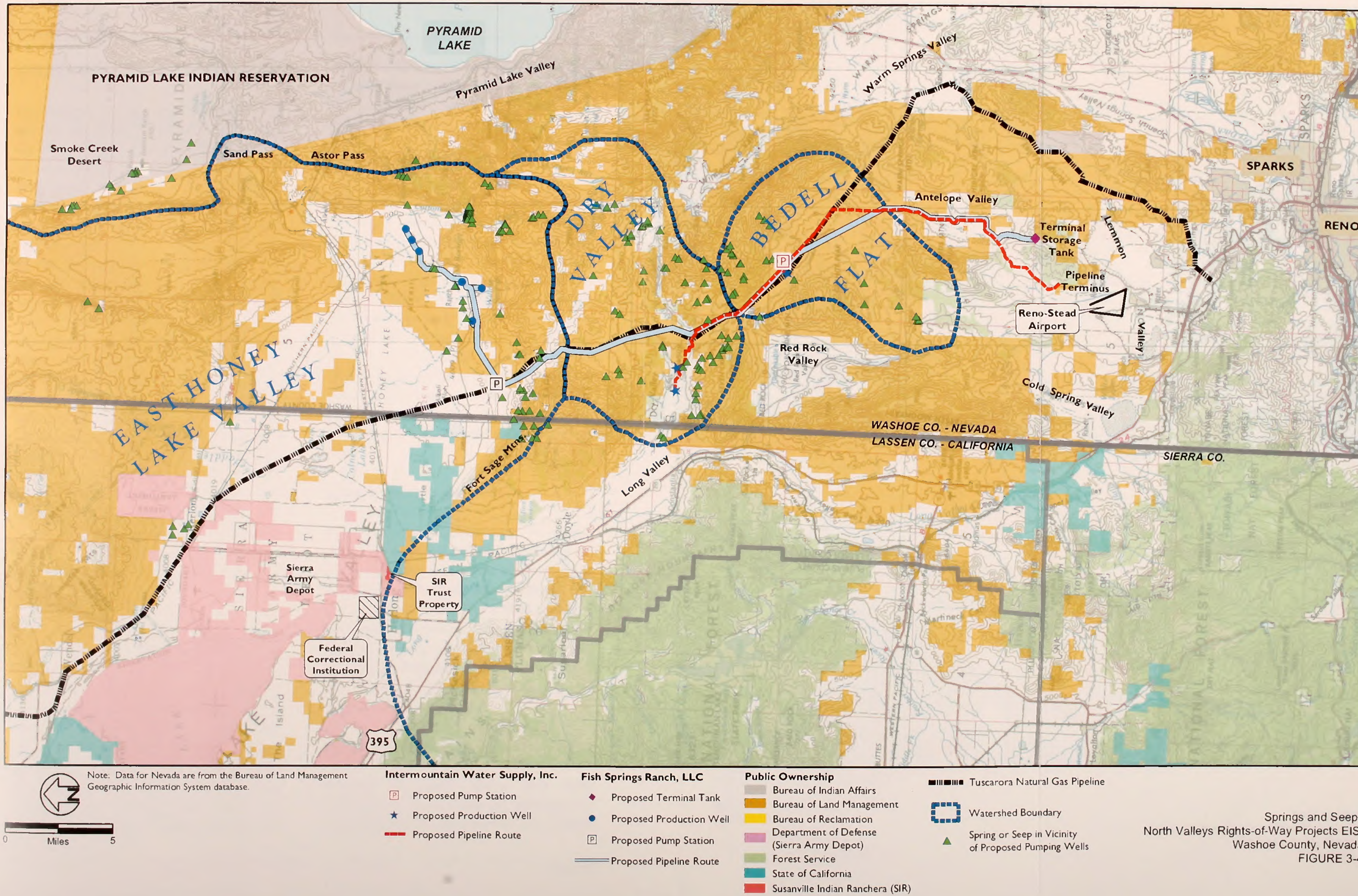
According to BLM (1993), quality of springs discharging from volcanic tuffs is dominated by sodium cations, and those discharging from basalt primarily have calcium cations. Springs in Smoke Creek Desert (adjacent to northeast side of Honey Lake Valley) have the poorest water quality in the Study Area.

Analytical results for five springs in Dry Valley sampled by the USGS (Berger *et al.* 2004) in January and March 2003 show the following ranges: EC = 134 to 380 µmhos/cm; pH = 6.3 to 7.6 standard units; temperature = 7.2 to 13.0 ˚C; dissolved oxygen = 5.2 to 11.5 mg/L; alkalinity = 33 to 139 mg/L; sulfate = 4.5 to 29.4 mg/L; chloride = 3.1 to 23.1 mg/L; nitrate+nitrite = 0.3 to 1.79 mg/L; arsenic = 0.0016 to 0.0094 mg/L; and selenium = 0.0003 to 0.001 mg/L. Other metals also were analyzed by the USGS (Berger *et al.* 2004) with results showing low or non-detectable concentrations.

Several springs have been identified in the southwest end of Bedell Flat, including Whitney, Bird, and Juniper springs (InterFlow Hydrology and Cordilleran Hydrology 2003). On the southern flank of Dogskin Mountain in the northern part of Bedell Flat are several springs, including Bedell, Willow, Matley, and Settlemeyer. These springs produce small flows.

During the 1989 inventory, JBR Consultants (1990a) noted that approximately 45 percent of the springs had been developed by piping, damming, fencing, or other improvements. Most of the developed springs appeared to be for purposes of livestock watering. A large variety of plant and animal life near the springs also was observed by JBR Consultants (1990a).

EIS\north_valley\arcmap\draft_eis\seep_sprgs.mxd



Springs and Seeps
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 3-4

GROUNDWATER QUANTITY

Groundwater is present in the Study Area in bedrock and valley-fill sediment. Relatively impermeable granitic bedrock forms a lower boundary to most groundwater flow within the Study Area. Volcanic rocks (e.g., basalt and andesite) comprise most of the mountain areas surrounding the valley floors, and have relatively high permeability where fractured. The valley-fill sediment consists of unconsolidated and semi-consolidated deposits having various mixtures of clay, silt, sand, and gravel. Poorly sorted alluvial fan material is located along the basin margins at the base of the mountain fronts, interfingering with dominantly fine-grained valley floor lake deposits. The alluvial fan sediment has moderate to high permeability. Semi-consolidated deposits in the valley floors are comprised of thick volcanic tuff and ash layers that were deposited in shallow lakes, along with lacustrine and fluvial clay, silt, and sand. Most of these valley-fill deposits have low permeability, with some coarser-grained zones having moderate permeability. See the "*Geology, Minerals and Paleontology*" section in this chapter for more information on geologic setting.

Most groundwater recharge occurs in the mountain areas surrounding valley floors where precipitation rates are higher and infiltration occurs directly into fractured bedrock (**Figure 3-3**). A portion of precipitation that falls on valley-fill sediment infiltrates into the unconsolidated material, recharging shallow groundwater in the sediments, and deeper groundwater in the underlying bedrock. Some of the snowmelt water and storm runoff in the mountains collects in drainage channels and flows down to alluvial fans along the margins of the valley floor where most of the surface water infiltrates and/or is subject to evapotranspiration.

HONEY LAKE VALLEY

Honey Lake Valley is a northwest-trending closed basin located on the western side of the Sierra Nevada Mountain Range about 35 miles north of Reno, Nevada. The basin covers an area of about 2,200 square miles, with most of which is located in California. Long Valley Creek and Susan River are the primary streams that drain into the center of the basin at Honey Lake. This shallow lake has no surface outflow and periodically becomes dry. The focus of the Proposed Projects is in eastern Honey Lake Valley where Fish Springs Ranch would pump water from six wells at 8,000 acre-feet per year (af/yr).

Eastern Honey Lake Valley

Information about groundwater in eastern Honey Lake Valley is available from numerous studies that have been conducted in the study area. The 1993 Draft EIS for Bedell Flat Pipelines Rights-of-Way (BLM 1993) contains a summary of groundwater information collected for eastern Honey Lake Valley. Since that time, additional groundwater studies and monitoring have been completed using monitoring and irrigation wells in the valley.

Recharge/Discharge

Recharge to eastern Honey Lake Valley groundwater occurs from: 1) infiltration of direct precipitation and snowmelt into bedrock

and valley-fill sediment; 2) infiltration of stream flow; 3) seepage from irrigation water; and 4) groundwater underflow from adjacent areas. Using a deep percolation model, Handman *et al.* (1990) estimated mean annual recharge to eastern Honey Lake Valley from precipitation as ranging from no recharge in the valley floors to 3 in/yr in the Virginia Mountains. Overall recharge from precipitation in eastern Honey Lake Valley is about 4,200 af/yr (Handman *et al.* 1990). Another recharge estimation method used by Handman *et al.* (1990) is based on a percentage of precipitation: 25 percent where precipitation is >20 inches; 15 percent in the 15-20 in/yr precipitation zone; 7 percent where precipitation is 12 to 15 in/yr; 3 percent in the 8 to 12 in/yr zone; and 0 percent where precipitation is <8 in/yr. Results of this recharge estimate are similar to deep percolation method results for the study area.

Infiltration of stream flow in eastern Honey Lake Valley occurs primarily in the alluvial fan areas where permeability of the sediment is moderate to high. In the eastern part of the valley, recharge from streams is estimated to be about 10,000 af/yr (Handman *et al.* 1990).

Water used for irrigation in eastern Honey Lake Valley has been primarily from several large production wells on Fish Springs Ranch. Because the infiltrated portion of this water is still part of groundwater withdrawal, it is accounted for in the discharge terms.

Approximately 5,600 af/yr was estimated by Handman *et al.* (1990) as groundwater underflow into eastern Honey Lake Valley, most of which occurs in the southeastern corner. Deep faults associated with the Walker Lane structure (e.g., Warm Springs fault) extend through this part of the Study Area. Source of geothermal water in eastern Honey Lake Valley likely is from groundwater flow within the basin (Handman *et al.* 1990). Isotope and chemical analysis of water samples from eastern Honey Lake Valley by Bohm (1990) indicates that groundwater from irrigation wells on the west side of Fish Springs Ranch is derived primarily from the Warm Springs fault zone; whereas, groundwater in the southern and eastern portions of the ranch are from shallow flow systems in the Virginia Mountains.

Direction of groundwater flow in eastern Honey Lake Valley varies throughout the Study Area, generally moving from the mountain and upland recharge areas to the valley lowlands. As mentioned above, groundwater appears to flow into the basin from the southeast corner of Honey Lake Valley (Virginia Mountains area), but may flow east out of the eastern side of the valley to Pyramid Lake Valley (via Astor Pass area) and Smoke Creek Desert (via Sand Pass area). A groundwater divide appears to be located about 3 miles west of the state line, resulting in no horizontal groundwater movement in this area (Lahontan GeoScience 2004; Webber 1996). Groundwater also flows south to the interior of eastern Honey Lake Valley from the northern mountains.

Groundwater discharge from eastern Honey Lake Valley occurs from: 1) evapotranspiration; 2) subsurface outflow; and 3) production wells. Evapotranspiration occurs primarily from areas of shallow groundwater, phreatophytes, and playa water bodies. According to Handman *et al.* (1990), approximately 89 percent of total precipitation and stream flow into the study area is discharged by evapotranspiration on the surface. The remaining 11 percent

evapotranspirates from shallow groundwater or discharges from the basin as subsurface outflow. Evapotranspiration rates from areas of phreatophytic vegetation generally ranges from 0.1 to 0.3 ft/yr (Handman *et al.* 1990; Walker & Associates 2004). Walker & Associates (2004) recommends that the extinction depth for evapotranspiration be specified as 30 feet.

Over the last 10 years, approximately 3,000 to 5,000 af/yr of groundwater has been pumped from irrigation wells in eastern Honey Lake Valley (i.e., Fish Springs Ranch); about 25 percent of this water is estimated to infiltrate back into the groundwater system (Handman *et al.* 1990). The "perennial" or "safe-yield" of eastern Honey Lake Valley (i.e., maximum amount of natural groundwater discharge that can be salvaged each year over the long-term by pumping without bringing about some undesired result) was determined by the Nevada State Engineer in 1991 to be 13,000 af/yr. Review of recharge estimates for eastern Honey Lake Valley completed by Mayo and Slossen (1992) identified 13,000 af/yr as an overestimate of perennial yield.

According to California Department of Water Resources Bulletin 118 (2004), total groundwater withdrawal from Honey Lake Valley is approximately 70,000 af/yr. Groundwater uses include agriculture at 51,000 af/yr; municipal and industrial uses at 15,000 af/yr; and environmental wetland uses at 4,000 af/yr.

Hydrogeology

Principal aquifers in eastern Honey Lake Valley are unconsolidated basin fill on the valley floor and fractured volcanic rocks in the surrounding uplands and mountains. Depth to granitic bedrock beneath the valley floor increases to about 5,000 feet in the northeast due to down-dropping east of the Warm Springs fault zone (Handman *et al.* 1990; Herlong Utilities Cooperative 2003).

Well completion data for five irrigation wells (Wilson, Ferrel, Jarboe, Headquarters, and Hodges; **Figure 3-5**) at Fish Springs Ranch in southeastern Honey Lake Valley are presented in **Table 3-3**. These wells are completed to depths of 246 to 492 feet, with depth to water in the range of 25 to 60 feet below ground surface. Four of the wells are completed in volcanic rocks, and one well is completed in valley-fill sediment. The groundwater surface for this "regional" basin-wide groundwater system is at an elevation in the range of about 3,900 to 4,100 feet amsl.

The Washoe County Utility Division completed 26 wells in the vicinity of Fish Springs Ranch in 1989-90 as part of the Truckee Meadows Project. These wells included monitoring and observation wells used during extensive aquifer testing by pumping the irrigation wells mentioned above. Wells were also installed in the Sand Pass and Astor Pass areas to investigate potential interbasin groundwater flow out of eastern Honey Lake Valley. Washoe County monitored water levels in the wells monthly through spring 1991. Monitoring frequency diminished to annual measurements by spring 1999 when the program was terminated.

In March 2003, Fish Springs Ranch began monitoring water levels in 13 of the Washoe

County wells. Each well was equipped with a recorder to collect hourly depth to water measurements. Water levels in these wells generally fluctuate several feet in response to pumping; however, water levels generally recover during the non-irrigation season.

Mean horizontal hydraulic conductivity of valley-fill material in eastern Honey Lake Valley is estimated to be 8 feet per day (ft/day) (Handman *et al.* 1990). In general, permeability is highest in the alluvial fan deposits along the mountain fronts, and in fractured volcanic rocks in the mountains and underlying portions of the valley floor. Lowest permeability likely is in the massive granite bedrock. Permeability of valley-fill sediment generally decreases with depth and toward the basin center.

Prior to 1989, seven wells in eastern Honey Lake Valley were subject to pumping tests with resulting transmissivity values of 50 to 30,000 ft^2/day (William E. Nork Inc. 1991). In 1989, five irrigation wells were tested by Washoe County, with resulting transmissivity values of 9,500 to 67,000 ft^2/day (William E. Nork Inc. 1991). Five additional wells were test pumped in 1990, four of which are completed in volcanics, including the Sand Pass and Astor Pass wells. Transmissivities for the wells completed in volcanics are in the range of 25 to 14,000 ft^2/day (William E. Nork Inc. 1991).

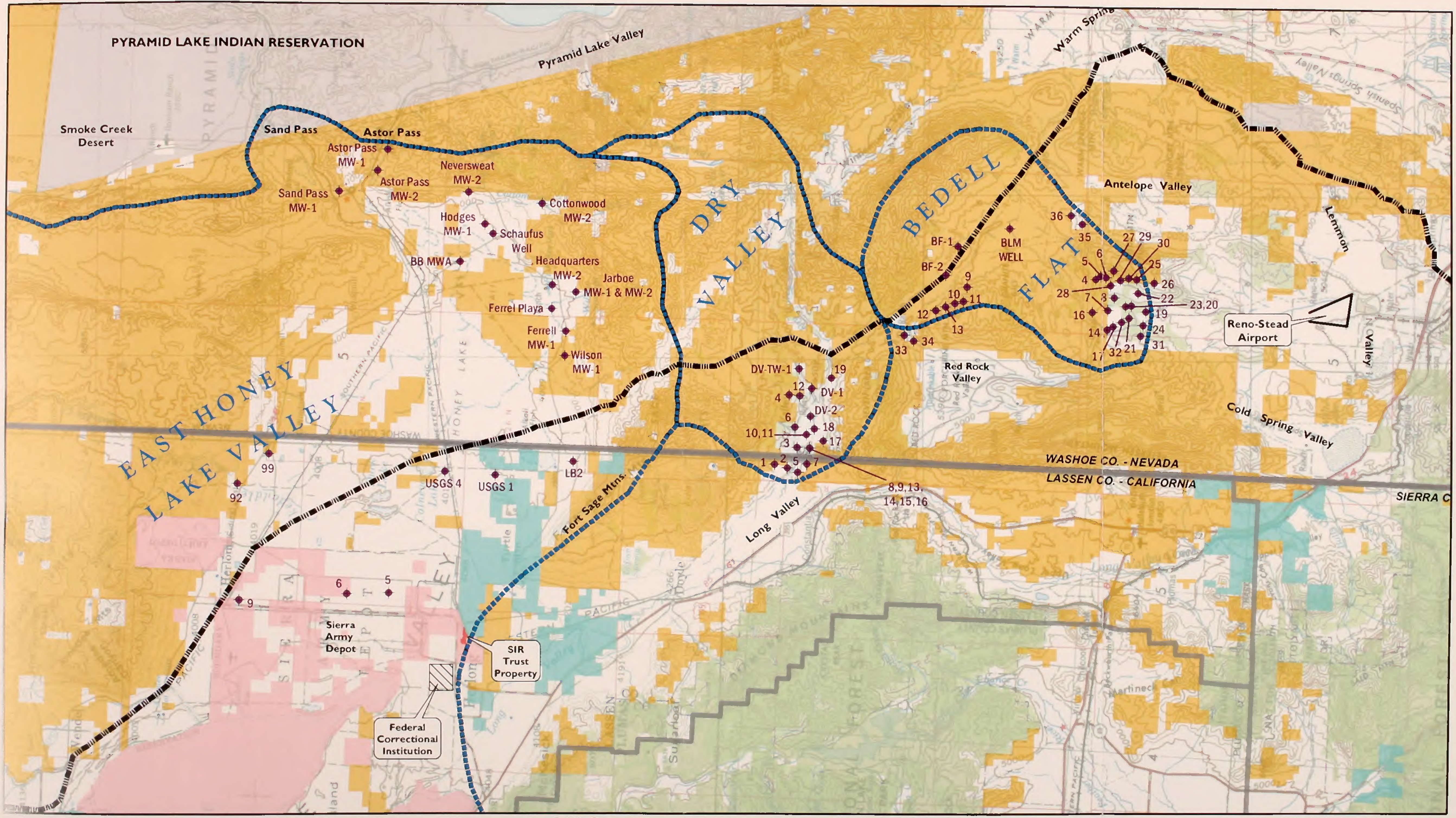
Sierra Army Depot Area

Monitoring and supply wells in the Sierra Army Depot (Depot) area in western Honey Lake Valley, California (**Figure 3-1**) are completed in valley-fill deposits. Mean hydraulic conductivity of the unconsolidated sediment and volcanic rocks is approximately 8 ft/day (Harding Lawson Associates 1994). Depth to groundwater varies over the Depot area, ranging from a few feet adjacent to Honey Lake, to about 120 feet near the south end of the Depot (Harding Lawson Associates 1994). Elevation of the water table is about 3,990 feet amsl.

Groundwater pumping for potable and irrigation purposes at the Depot began in 1942, with an average pumping rate of 1,500 to 2,000 af/yr during the 1980s (BLM 1993). This pumping was distributed between four water supply wells located in the southern part of the Depot. A 14-day pumping test was performed for one of the wells at rates of up to 2,350 gal/min. Transmissivity calculated from the drawdown and recovery data ranged from 9,000 to 11,000 ft^2/day (Herlong Utilities Cooperative 2003).

Groundwater flow is generally to the north in the southern part of the Depot, and to the west-southwest in the northern part of the property (Harding Lawson Associates 1994). Groundwater in the western part of the Depot has a slight westward component of flow. A groundwater divide is located along the east-central portion of the Depot that separates east and west flowing groundwater. This groundwater divide is in a similar location to the divide described previously for eastern Honey Lake Valley.

EIS\north_valley\arcmap\draft_eis\exist_well.mxd



Note: Data for Nevada are from the Bureau of Land Management Geographic Information System database.

0 Miles 4

Public Ownership

- Bureau of Indian Affairs
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense (Sierra Army Depot)
- Forest Service
- State of California
- Susanville Indian Ranchera (SIR)

Tuscarora Natural Gas Pipeline

Watershed Boundary

37 Existing Well in Vicinity of Proposed Pumping Well

Existing Wells
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 3-5

TABLE 3-3
Completion Data and Aquifer Characteristics for Selected Wells in Honey Lake Valley, Dry Valley, and Bedell Flat

Well ID	Location (Qtr, Sec, Twp/Rng)	Year Drilled	Diameter (inches)	Total Depth (feet)	Approx. Depth to Water (feet)	Primary Lithology	Trans-missivity (ft^2/day)	Water Elevation (feet amsl)	Use
Southeastern Honey Lake Valley – Fish Springs Ranch Irrigation Wells									
Wilson	NW,SE,Sec26, T26N,R18E	1985	16	440	40	Alluvium	6,700 – 21,000	*	Irrigation
Ferrel	NE,SW,Sec25, T26N,R18E	1975	12.75	246	25	Alluvium/ volcanics	7,700 – 24,000	*	Irrigation
Jarboe	SE,SE,Sec30, T26N,R19E	1984	16/12.75	492	60	Alluvium/ volcanics	5,000 – 50,000	*	Irrigation
Head-quarters	NE,NW,Sec29 T26N,R19E	1954	14	400	50	Volcanic bedrock	12,000 – 67,000	*	Irrigation
Hodges	SE,SW,Sec10, T26N,R19E	1980	12.75	255	40	Volcanic bedrock	18,000 – 43,000	*	Irrigation
Western Dry Valley									
DV-1	NE,NW,Sec15, T24N,R18E	---	2	20	10	Alluvium	---	4,485	Monitor
DV-2	NE,SW,Sec09, T24N,R18E	---	2	35	25	Alluvium	---	4,426	Monitor
DV-TW-1	NW,SE,Sec10, T24N,R18E	2004	6	710	5	Basin fill	140	4,496	Test Well
Marymee-4	SW,NW,Sec9, T24N,R18E	---	16	350	37	Basin fill	---	4,428	Domestic
Lenz-17	SW,SW,Sec8, T24N,R18E	---	8	100	29	Basin fill	---	4,409	Domestic& Irrigation
USGS-3	SE,NE,Sec9, T24N,R18E	2002	6	140	3	Basin fill	1,200 – 1,500	4,401	Monitor
USGS-8	NE,SE,Sec7, T24N,R18E	2002	2	150	6	Basin fill	---	4,396	Monitor
USGS-9	NE,SE,Sec7, T24N,R18E	2002	2	385	10	Basin fill	---	4,392	Monitor
USGS-10	NW,SW,Sec8, T24N,R18E	2002	2	32	3	Alluvium	---	4,406	Monitor
USGS-11	NW,SW,Sec8, T24N,R18E	2002	2	32	3	Alluvium	---	4,405	Monitor
USGS-14	SE,NE,Sec7, T24N,R18E	2002	2	40	6	Alluviuim	---	4,398	Monitor
USGS-15	SE,NE,Sec7, T24N,R18E	2002	2	250	11	Basin fill	---	4,393	Monitor
USGS-16	SE,NE,Sec7, T24N,R18E	2002	2	547	17	Basin fill	---	4,387	Monitor
Irrigation-	Sec7,	---	16	440	11	Basin fill	1,200 – 1,500	4,395	Irrigation

TABLE 3-3 (continued)
Completion Data and Aquifer Characteristics for Selected Wells in Honey Lake Valley, Dry Valley, and Bedell Flat

Well ID	Location (Qtr, Sec, Twp/Rng)	Year Drilled	Diameter (inches)	Total Depth (feet)	Approx. Depth to Water (feet)	Primary Lithology	Trans-missivity (ft²/day)	Water Elevation (feet amsl)	Use
13	T25N,R18E								
Bedell Flat									
BF-1	NW,NE,Sec9, T23N,R19E	1972	16	950	46	Basin fill	22,436	4,897	Test Well
BF-2	SE,SE,Sec5, T23N,R19E	1978	12.75	400	63	Basin fill	29,915	4,879	Test Well
BLM Well	SE,SW,Sec22, T23N,R19E	---	---	224	180	Basin fill	---	4,909	Stockwater
Bloom-35	SE,SE,Sec35, T23N,R19E	---	---	650	430	Basin fill	---	4,909	Domestic
Nelson-24	Sec07, T22N,R19E	---	---	275	155	Fractured Bedrock	---	5,669	Domestic
Etcheverry -16	Sec.06, T22N,R19E	---	---	225	61	Fractured Bedrock	---	5,681	Domestic

Source: BLM 1993; ECO:LOGIC 2002; William E. Nork, Inc. 1991; InterFlow Hydrology and Cordilleran Hydrology 2003; InterFlow 2004a; Stantec and Cordilleran Hydrology 2000; Berger *et al.* 2004.
Note: --- = unknown or not applicable. * = water elevation data not available without removing pump. T = Township; R = Range; Sec = Section; Qtr = Quarter Section; amsl = above mean sea level. See **Figure 3-5** for well locations.

DRY VALLEY

The Fort Sage Mountains and Virginia Range are on the north side of Dry Valley. The southern part of Dry Valley is bound by Seven Lakes Mountain and Dogskin Mountain. These mountains reach elevations of about 6,000 to 9,000 feet amsl. Lower (west-central) Dry Valley is the location of two proposed production wells by Intermountain Water Supply. This part of the valley floor is 1 to 1.5 miles wide and 4 miles long, with an elevation of about 4,400 to 4,800 feet amsl.

Recharge/Discharge

Rush and Glancy (1967) estimated long-term average groundwater recharge to Dry Valley of about 2,400 af/yr from precipitation, with groundwater outflow of about 2,200 af/yr. Groundwater outflow from Dry Valley is believed to be primarily to the west into Long Valley, California; although some groundwater may flow out of the upper valley via the Walker-Lane fault or shear zone. The remaining 200 af/yr of recharge is balanced by evapotranspiration and consumptive use in Dry Valley. Rush and Glancy (1967) estimated 280 acres of phreatophytes in Dry Valley with a water consumption of 80 af/yr.

Two methods of estimating recharge (Maxey-Eakin and Berger-Nichols) to Dry Valley were used by Stantec Consulting and Cordilleran Hydrology (2000). Results indicate groundwater recharge rates of 2,670 and 11,150 af/yr. The Desert Research Institute (DRI 2003) estimated groundwater recharge to Dry Valley from precipitation of 1,400 to 48,000 af/yr using the chloride mass balance method.

During 2002-2004, the USGS conducted a hydrogeologic study of the western part of Dry Valley (Berger *et al.* 2004). The USGS study included seismic-refraction profiling, installing monitoring wells, collecting borehole geophysical data, measuring water levels, performing aquifer tests, mapping phreatophytic vegetation and geology, and analyzing water samples from wells and springs. The USGS (Berger *et al.* 2004) estimated total groundwater discharge from Dry Valley ranges from about 700 to 1,000 af/yr. This total discharge comprises the following estimates: (1) subsurface outflow of 50 to 250 af/yr; and (2) evapotranspiration of 640 to 790 af/yr.

Areas of evapotranspiration were field mapped by the USGS (Berger *et al.* 2004) and partitioned into zones of plant cover using relations derived from satellite imagery. Evapotranspiration rates for each plant-cover zone were multiplied by the corresponding area and summed to estimate annual groundwater evapotranspiration. The USGS (Berger *et al.* 2004) considers the amount of subsurface outflow to Honey Lake Valley and/or Winnemucca Valley via bedrock fractures associated primarily with the Walker Lane fault zone negligible given the limited information available to evaluate this connection. The amount of groundwater outflow from Dry Valley westward to Long Valley, California was estimated using results of seismic-refraction profiling, installation of monitoring wells, borehole geophysical data, water level measurements, and aquifer tests.

The "perennial" or "safe-yield" of Dry Valley (i.e., maximum amount of natural groundwater discharge that can be salvaged each year over the long-term by pumping without bringing about some undesired result) was determined by the Nevada State Engineer in 2002 to be 3,000 af/yr.

Hydrogeology

Dry Valley is comprised of complexly faulted mountain blocks with the faults oriented southeast to northwest (Stantec Consulting and Cordilleran Hydrology 2000). The faults are part of the Walker- Lane fault/shear zone. The Dry Valley floor is composed of valley-fill sediment that is over 1,000 feet thick.

Existing wells in Dry Valley consist of irrigation, domestic, stock, and monitoring wells. The USGS inventoried 19 wells in the valley, eight of which were installed by the USGS in 2002 (Berger *et al.* 2004). These eight monitoring wells, as well as three of the other domestic and irrigation wells are presented in **Table 3-3** and shown on **Figure 3-5**. All of the wells are completed in unconsolidated valley-fill sediments. The three domestic/irrigation wells are completed to depths of 100 to 440 feet. The eight USGS monitoring wells are completed to depths ranging from 32 to 547 feet.

The eight USGS monitoring wells were installed in five boreholes located near the state line in western Dry Valley (**Figure 3-5**). Depth to water is less than 10 feet near the valley floor, and increases to 30 feet or more near the toe of alluvial fans on the southern and northern sides of the valley floor. Groundwater elevations indicate that flow in the valley floor is westward toward Long Valley, California. The water table gradient increases from 0.003 ft/ft east of the state line to 0.005 ft/ft west of the state line (Berger *et al.* 2004). Nested piezometers installed by the USGS indicate a downward vertical hydraulic gradient, although vertical hydraulic conductivity is low due to interbedded clay.

As stated in the previous section, there is potential for groundwater outflow through bedrock fractures associated with the Walker Lane fault zone in upper Dry Valley. Groundwater in the fault zone would likely move southeast to Winnemucca Valley and/or northwest to Honey Lake Valley. The USGS, however, believes that there likely is no significant groundwater outflow to these areas due to similar elevations of phreatophytes between Dry Valley and Winnemucca Valley, and the lack of springs and seepage in Honey Lake Valley where the fault zone intersect the valley floor near the state line (Berger *et al.* 2004).

Constant discharge pumping tests were performed by the USGS in two Dry Valley wells, with resulting transmissivity values of 1,200 to 1,500 ft^2/day (Berger *et al.* 2004). Using the saturated thickness of aquifer encountered by each of the two wells, hydraulic conductivity is calculated in the range of 3 to 12 ft/day.

During 2004, Intermountain Water Supply completed a 6-inch diameter test well in Dry Valley approximately 2.5 miles east of the state line (**Figure 3-5**) (InterFlow Hydrology 2004b). The well is 700 feet deep and encountered an upper unconfined aquifer extending to a depth of approximately 240 feet, and a lower confined aquifer below a depth of approximately 505 feet. Both aquifers are in alluvium consisting of interbedded gravel, sand, and clay. The aquifers are separated by an interval of alluvium containing greater amounts of clay.

Depth to water in the unconfined aquifer is about 5 feet below land surface. Potentiometric head of the confined aquifer is about 22 feet above land surface, indicating an upward vertical hydraulic gradient. Following completion, the well exhibited artesian flow of 35 gal/min. Water produced from the test well is slightly geothermal (75 to 85 °F) which comes from the confined aquifer. Two samples indicate the water meets drinking water standards, with TDS of 210 mg/L (InterFlow Hydrology 2004b).

Results of a 24-hour constant discharge pumping test and 8-hour step-drawdown pumping test indicate the aquifer has a transmissivity of 100 to 200 ft^2/day and hydraulic conductivity of 0.2 ft/day, which is low for typical alluvial basin-fill sediments. After the pumping tests, the well was slow to recover to pre-test water levels. According to InterFlow Hydrology (2004b), the slow recovery could result in part from residual drilling mud plugging the well bore. InterFlow Hydrology (2004b) believes a production well at this location would need to be operated with non-pumping periods to sustain reasonable water levels in the well over the long-term.

BEDELL FLAT

Bedell Flat valley floor has an elevation of about 5,000 feet amsl, draining northwest to Red Rock Valley. Width and length of Bedell Flat are about 5.5 miles and 8.5 miles, respectively. Mountains surrounding Bedell Flat include Dogskin Mountain to the north, Sand Hills to the west, Freds Mountain to the south, and unnamed hills to the east. Elevation of the mountains ranges from about 6,000 to 7,500 feet amsl.

Recharge/Discharge

Groundwater recharge to Bedell Flat was estimated by InterFlow Hydrology and Cordilleran Hydrology (2003) using two methods (Maxey-Eakin and Chloride-Balance). Results show groundwater recharge rates of 1,100 and 1,500 af/yr.

Subsurface outflow of groundwater is believed to occur from Bedell Flat to Red Rock Valley near the northwest side of the basin where depth to groundwater is shallow near Campbell Spring (InterFlow Hydrology and Cordilleran Hydrology 2003; InterFlow Hydrology 2004a). Some groundwater flow may also occur through the hills dividing Antelope Valley from Bedell Flat. Groundwater discharge occurs via evapotranspiration (30 af/yr), springs (50 af/yr), wells (70 af/yr), and subsurface outflow (85 af/yr to Red Rock Valley and 1,100 af/yr unaccounted outflow) (InterFlow Hydrology and Cordilleran Hydrology 2003). Interflow Hydrology (2004a) interprets Bedell Flat to be in a state of hydrologic equilibrium with a total natural groundwater recharge and discharge of approximately 1,300 af/yr.

The "perennial" or "safe-yield" of Bedell Flat (i.e., maximum amount of natural groundwater discharge that can be salvaged each year over the long-term by pumping without bringing about some undesired result) was determined by the Nevada State Engineer in 2004 to be 300 af/yr (Ruling 5429 granted 144 af/yr to Intermountain Water Supply). This ruling, however, is currently under appeal by Intermountain Water Supply.

Hydrogeology

Depth to groundwater in Bedell Flat ranges from over 180 feet in the central basin area, to near ground surface at the northwest side of the basin (InterFlow Hydrology and Cordilleran Hydrology 2003). Groundwater elevations are about 5,000 to 5,600 feet in the south half of Bedell Flat, and about 4,900 feet in the northwest part of the basin. According to Berger *et al.* (2001), exposures of older basin-fill deposits cover about 30 percent of the drainage area in Bedell Flat, and younger alluvium covers about half of the valley. Thickness of valley-fill deposits decreases to the northwest corner of Bedell Flat and is up to 2,500 feet thick (includes some volcanic rocks) in the center of the basin (Berger *et al.* 2001). The presence of shallow groundwater in the northwest part of Bedell Flat may be related to the thinning sediment.

Approximately 35 domestic wells have been drilled in the southern portion of Bedell Flat (**Figure 3-5**) (InterFlow Hydrology and Cordilleran Hydrology 2003). These wells typically are completed to depths ranging from 150 to 850 feet, most of which are into volcanic rocks.

In the 1970s, two production-capacity wells (BF-1 and BF-2; **Figure 3-5** and **Table 3-3**) were drilled in the northwest part of the basin (InterFlow Hydrology and Cordilleran Hydrology 2003). Well BF-1 was completed to a depth of 950 feet, with granite bedrock encountered at 944 feet. This well was tested by pumping at rates ranging from 180 to 690 gal/min. Depth to water in well BF-1 was about 53 feet below ground surface. Production well BF-2 was completed to a depth of 400 feet, with a static water level of 63 feet below ground surface. This well was test pumped a rates of 200 to 450 gal/min. The resulting transmissivity values calculated from these pumping tests are about 22,000 and 30,000 ft^2/day, with hydraulic conductivity of about 1.0 ft/day (InterFlow Hydrology 2004a). Based on well lithology, the valley-fill aquifer is unconfined to semi-confined (InterFlow Hydrology 2004a).

ANTELOPE AND LEMMON VALLEYS

Antelope Valley is bounded on the east by Hungry Mountain and Warm Springs Mountain, on the west by Fred's Mountain, on the south by two unnamed mountains that separate Antelope Valley from Lemmon Valley, and on the north by a series of low hills that separate Antelope Valley from Bedell Flat (Berger *et al.* 2001). The Antelope Valley floor is about 2 miles wide and 5 miles long, with a playa in the lowest part of the basin (5,100 feet elevation). Thickness of valley-fill deposits in Antelope Valley is not greater than about 300 feet, suggesting limited groundwater volume compared to other basins in the study area (Berger *et al.* 2001).

Depth to groundwater in Lemmon Valley varies from 10 to 100 feet, with a decline of 35 to 50 feet that has occurred since the early 1970s due to domestic and industrial uses (BLM 1993). Recharge from golf course irrigation and septic systems has raised the groundwater table in some areas (BLM 1993). Subsurface inflow and outflow at Lemmon Valley likely are minor. The Nevada State Engineer specified a perennial or safe yield for Lemmon Valley at 1,500 af/yr (BLM 1993).

GROUNDWATER QUALITY

This section describes groundwater quality characteristics based on samples collected and analyzed from wells in Honey Lake Valley, Dry Valley, and Bedell Flat.

EASTERN HONEY LAKE VALLEY

Quality of water in eastern Honey Lake Valley is characterized by sodium and bicarbonate as the predominant ions. Sodium, chloride, and TDS increase toward the center of the basin, with increasing depth, and with geothermal water. Isotope analysis of water samples from Honey Lake Valley by Bohm (1990) indicates that the playa areas are groundwater sinks where evaporation causes high salinity.

Concentrations of TDS have been determined for numerous wells in Honey Lake Valley (BLM 1993). TDS levels in groundwater near the eastern Honey Lake Valley playa area are high (up to 50,000 mg/L) (BLM 1993). South of the playa area, TDS is in the range of 100 to 400 mg/L. In the vicinity of the proposed Fish Springs Ranch wellfield southeast of the playa, TDS in groundwater ranges from about 200 to

300 mg/L. TDS concentrations are in the range of 1,600 to 2,500 mg/L for wells completed in the vicinity of Sand and Astor Passes (northeast of proposed Fish Springs Ranch wellfield).

Water samples were collected and analyzed from five irrigation wells at Fish Springs Ranch (Wilson, Farrel, Jarboe, Headquarters, and Hodges; **Figure 3-5**) during 1984-90 and 2003. These wells are located near the proposed production wells shown on **Figure 3-1**. Results of the analyses performed in 2003 are presented in **Table 3-4**. These data show variable quality, with TDS in the range of 160 to 490 mg/L. Sodium is from 24 to 130 mg/L, and sulfate ranges from 8 to 230 mg/L. Highest concentrations for all of the above constituents are from the Wilson well which is located closest to the playa. Concentrations of metals from all five irrigation wells are low; however, arsenic is elevated (0.039 mg/L) in the Wilson well sample. This arsenic concentration exceeds the revised arsenic drinking water standard of 0.01 mg/L that becomes effective in January 2006. Results of other groundwater samples collected in 1986 and 1989 show that three of the five wells at Fish Springs Ranch exceeded the pending arsenic standard. For samples and parameters presented in **Table 3-4**, no other drinking water standards are exceeded for the Wilson, Farrel, Jarboe, Headquarters, and Hodges wells.

Sierra Army Depot Area

Groundwater quality at the Sierra Army Depot is variable, with TDS in the range of 290 to 1,020 mg/L (BLM 1993). Potential contamination of groundwater has been investigated at several areas of the Depot: 1960 Demolition Area, Large Sewage Treatment Ponds, Lower Burning Ground, and Building 210 Area. Results of these investigations show that acetone and methylene ketone were detected in some samples from the Lower Burning Ground, and TCE was detected in groundwater from the Building 210 Area (Harding Lawson Associates 1994).

DRY VALLEY

Water quality samples were collected and analyzed by the USGS (Berger *et al.* 2004) in three wells in Dry Valley (USGS-9, -14, -19; **Figure 3-5**). Results of these analyses (**Table 3-4**) show that specific conductance is in the range of 435 to 530 µS/cm, alkalinity ranges from 190 to 210 mg/L, and sulfate ranges from 15 to 30 mg/L. TDS was not reported for Dry Valley samples.

Field measurements also indicate these groundwater samples having temperature ranging from 12.5 to 18.5 °C, and dissolved oxygen in the range of 0.1 to 5.6 mg/L. Concentrations of some other constituents, including metals, are shown in **Table 3-4**. For the samples and parameters presented in **Table 3-4**, no drinking water standards are exceeded except for the secondary standard for manganese of 0.05 mg/L. Other metals were analyzed by the USGS (Berger *et al.* 2004) with results showing low or non-detectable concentrations.

TABLE 3-4 Chemical Analysis of Groundwater Samples Eastern Honey Lake Valley, Dry Valley, and Bedell Flat										
Parameter	Water Quality Analyses (milligrams per liter unless otherwise noted)									
	Honey Lake Valley - Fish Springs Ranch					Bedell Flat		Dry Valley		
	Wilson	Farrel	Jarboe	Head-quarters	Hodges	BF-1	BF-2	USGS-9	USGS -14	USGS -19
TDS	490	380	160	180	190	138	144	435*	530*	528*
pH (std. units)	8.1	8.1	8.0	8.3	7.9	8.2	8.1	7.4	7.4	7.5
Turbidity (NTU)	<0.1	0.2	0.4	<0.1	0.2	---	---	---	---	---
Alkalinity	86	140	94	97	120	110	107	190	208	210
Calcium	21	25	15	2.9	11	22	26	26.5	22.0	35.3
Magnesium	1.9	6	5.1	1.5	5.1	5	4	13.8	9.8	20.2
Potassium	3.4	8.1	6.2	7.1	7.2	3	2	3.4	2.5	2.0
Sodium	130	90	24	44	34	23	22	52	87	53
Chloride	21	41	7	6.4	6.5	4	5	10.4	14.8	19.6
Fluoride	1.2	0.41	0.15	0.2	0.15	0.29	0.22	0.23	0.37	0.5
Sulfate	230	93	9.9	8.3	6.7	19	20	15.8	29.8	20.0
Nitrate	<0.05	1.5	1.1	1.1	0.87	0.65	1.1	0.8	<0.06	0.94
Arsenic	0.039	0.008	0.002	0.003	0.001	0.005	---	0.0075	0.0069	0.005
Barium	<0.001	0.007	0.004	0.008	0.031	---	---	0.039	0.048	0.05
Copper	<0.001	<0.001	<0.001	<0.001	<0.001	---	---	0.0006	0.0006	0.0055
Iron	<0.05	<0.05	0.08	<0.05	<0.05	0.06	0.02	<0.01	0.019	<0.008
Lead	<0.001	<0.001	<0.001	<0.001	<0.001	---	---	<.0008	<.0008	.00018
Manganese	0.022	<0.001	0.012	<0.001	<0.001	0.01	---	0.0513	0.407	0.103
Zinc	0.017	0.014	0.017	0.01	0.013	---	---	---	0.001	0.239

Source: ECO:LOGIC 2003; InterFlow Hydrology and Cordilleran Hydrology 2003; Berger *et al.* 2004.

Note:

1. All units in milligrams per liter (mg/L) unless otherwise shown in the first column.
2. TDS = total dissolved solids; NTU = nephelometric turbidity units.
3. Fish Springs Ranch wells sampled November 2003; Bedell Flat wells sampled August 1978; Dry Valley wells sampled May/June 2003.
4. * TDS values for Dry Valley wells are Specific Conductance in µS/cm.
5. For wells USGS-9, USGS-14, and USGS-19 in Dry Valley, manganese in groundwater exceeds the "secondary" drinking water standard of 0.05 mg/L. Groundwater from the Wilson well in eastern Honey Lake Valley will exceed the revised arsenic drinking water standard of 0.01 mg/L effective January 2006. Refer to **Table 3-5** for water quality standards.
6. See **Figure 3-5** for locations of wells.

BEDELL FLAT

Bedell Flat groundwater quality data are available for samples collected from three springs in the northern basin (BF-1 Stockwater, Settelmeyer, and Willow); two test wells in the north part of the watershed (BF-1 and BF-2); and five domestic wells in southern Bedell Flat (Richards, Hiibel, Reslock, Singley, and Leary) (**Figure 3-5**). Results of these analyses are presented by InterFlow Hydrology and Cordilleran Hydrology (2003), with selected

parameters for test wells BF-1 and BF-2 included in **Table 3-4**. Wells BF-1 and BF-2 are completed to depths of 950 and 400 feet, with water levels of 46 and 63 feet, respectively (**Table 3-3**). Water quality data from these wells indicates TDS concentrations less than 150 mg/L, sulfate of about 20 mg/L, and low levels of ions and metals. For the samples and parameters presented in **Table 3-4**, no drinking water standards are exceeded. Groundwater quality also is relatively good from domestic wells in the southern part of the valley, with TDS in the range of 170 to 320 mg/L (InterFlow Hydrology and Cordilleran Hydrology 2003).

ANTELOPE AND LEMMON VALLEYS

Quality of groundwater in Antelope Valley is unknown. In Lemmon Valley, groundwater quality is variable, with the poorest quality occurring near the playas (TDS up to 25,000 mg/L) (BLM 1993). Increasing nitrate concentrations have been observed in some domestic wells, likely due to septic systems throughout subdivision areas.

WATER USE/RIGHTS

NEVADA

Water rights for new surface water and groundwater supplies in Nevada are provided through the State Engineer's permitting process. The exception is that no permit is required for a domestic well serving a single-family dwelling and withdrawing no more than 1,800 gallons water per day. Proof of beneficial use of permitted water supplies and documentation of water consumption over a 1-year period are typically required. Numerous springs throughout the study area are used primarily for stock watering. Water use in eastern Honey Lake Valley is primarily associated with the irrigation wells at Fish Springs Ranch. These wells have been producing approximately 4,000 to 5,000 af/yr during the irrigation season. Historic records of pumping from Fish Springs Ranch since 1988 show that pumping rates have been in the range of 4,100 to 5,900 af/yr. Other wells were identified in eastern Honey Lake Valley by Handman *et al.* (1990), but their use is unknown.

In Dry Valley, only one well (Lenz well) is currently used for domestic and irrigation purposes (Stantec Consulting and Cordilleran Hydrology 2000). This well is located near the center of the valley at the state line.

In Bedell Flat, approximately 35 domestic wells have been completed in the southern part of the basin as part of the Red Rock Estates subdivision. These wells generally are completed in fractured bedrock (InterFlow Hydrology and Cordilleran Hydrology 2003). Non-domestic wells in Bedell Flat include the Animal Ark Wildlife Center well, International Community of Christ Church well, and a BLM stockwater well (InterFlow Hydrology and Cordilleran Hydrology 2003). Numerous domestic wells are also located in Lemmon Valley.

CALIFORNIA

Water rights for new surface water supplies in California are subject to issuance of a permit by the State Water Resources Control Board. The

State of California does not regulate extraction and appropriation of groundwater. However, local government and agencies can establish special districts or ordinances for management of groundwater resources. Groundwater Management Districts have been established for Honey Lake Valley and Long Valley in California (California Department of Water Resources 2005). At present, neither district is active, but they can be activated when needed. Lassen County has an ordinance requiring a permit to export groundwater from the county.

According to California Department of Water Resources Bulletin 118 (2004), total groundwater withdrawal from Honey Lake Valley is approximately 70,000 af/yr. Groundwater uses include agriculture at 51,000 af/yr; municipal and industrial uses at 15,000 af/yr; and environmental wetland uses at 4,000 af/yr.

Herlong Utilities Cooperative is the primary water supplier in the vicinity of the Sierra Army Depot and Federal Prison in western Honey Lake Valley. Two production wells were recently installed southwest of the Depot along lower Long Valley Creek. Estimated water supply from these wells will average 1,300 af/yr (Herlong Utilities Cooperative 2003). Several irrigation wells are located in Long Valley, California.

WATER QUALITY STANDARDS

Nevada surface water is regulated for quality standards established by the State of Nevada under Nevada Water Pollution Control regulations and statutes (Nevada Administrative Code [NAC] 445A.070 et seq.; Nevada Revised Statutes [NRS] 445A.300 et seq.) (**Table 3-5**). The State has established both narrative and numeric criteria. Statewide narrative criteria are applicable to all water. In addition to statewide narrative criteria, water quality standards for these three categories of water are included: class water, designated water, and toxic materials (toxic materials standards are in **Table 3-5**). Class water is water that is grouped together on the basis of the degree to which human impacts affect the beneficial uses of the waterbody. Designated water includes major waterbodies for which specific standards are established. Toxic standards are numeric criteria for toxic materials that apply to class and designated water and are specified for four beneficial use categories. Surface water in the Projects Area is neither class water nor designated water or tributaries to those water bodies. Narrative standards apply to surface water in the affected area. The Truckee River and its tributaries are classified as either designated water or class water.

SOIL RESOURCES

Information for soil resources in the Study Area (same as Projects Area) was obtained from the Soil Survey of Washoe County, Nevada, Central Part and South Part published by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) (USDA 1983a, 1983b). These surveys were completed by NRCS to an Order III level. The Soil Survey Geographic Database (SSURGO) data for these soil surveys were used to identify the mapping units proposed for disturbance as part of the proposed Projects (USDA 2004a, 2004b).

TABLE 3-5
Water Quality Criteria and Standards for Nevada

Parameter (mg/L, unless otherwise specified) [1]	Federal Drinking Water Standard		Nevada Municipal or Domestic Supply	Aquatic Life [3]		Agriculture		Wildlife Propagation
	Primary MCL [2]	Secondary MCL [2]		1-Hour Ave. or Propagation	96-Hour Ave. or Put & Take	Irrigation	Stock Water	
Antimony	0.006	---	0.146	---	---	---	---	---
Arsenic	0.05	---	0.05	0.342 As(III)	0.18 As(III)	0.1	0.2	---
Barium	2.0	---	2.0	---	---	---	---	---
Beryllium	0.004	---	0	---	---	0.1	---	---
Boron	---	---	---	---	---	0.75	5.0	---
Cadmium	0.005	---	0.005	0.0053 [4]	0.0013 [4]	0.01	0.05	---
Chromium	0.10	---	0.10	0.015 Cr(VI)	0.01 Cr(VI)	0.1	1.0	---
Copper	1.3	1.0	---	0.0221 [4]	0.0142 [4]	0.2	0.5	---
Iron	---	0.3 [0.6]	---	1.0	1.0	5.0	---	---
Lead	0.015	---	0.05	0.0684 [4]	0.0013 [4]	5.0	0.1	---
Manganese	---	0.05 [0.1]	---	---	---	0.2	---	---
Mercury	0.002	---	0.002	0.002	0.000012	---	0.01	---
Molybdenum	---	---	---	0.019	0.019	---	---	---
Nickel	0.1	---	0.0134	1.699 [4]	0.189 [4]	0.2	---	---
Selenium	0.05	---	0.05	0.02	0.005	0.02	0.05	---
Silver	---	---	---	0.0069 [4]	0.0069 [4]	---	---	---
Thallium	0.002	---	0.013	---	---	---	---	---
Zinc	---	5.0	---	0.140 [4]	0.127 [4]	2.0	25	---
Cyanide (WAD)	0.2	---	0.2	0.022	0.0052	---	---	---
Alkalinity	---	---	---	<25% change		---	---	30 – 130
Chloride	---	250 [400]	250 [400]	---	---	---	1,500	1,500
Color (PCU)	---	15	75	---	---	---	---	---
Dissolved Oxygen	---	---	Aerobic	5.0	5.0	---	Aerobic	Aerobic
Fluoride	4.0	2.0	---	---	---	1.0	2.0	---
Nitrate as N	10	---	10	90(w)	90(w)	---	100	100
Phosphorus, total as P	---	---	---	---	---	---	---	---
pH (su)	---	6.5 – 8.5	5.0 – 9.0	6.5 – 9.0	6.5 – 9.0	4.5 – 9.0	5.0 – 9.0	7.0 – 9.2
Sulfate	---	250 [500]	250 [500]	---	---	---	---	---
Temp (°C)	---	---	---	---	Site-specific	---	---	---
TDS	---	500 [1000]	500 [1000]	---	---	---	3,000	---
TSS	---	---	---	25 – 80	25 – 80	---	---	---
Turbidity (NTU)	1.0	---	---	50(w); 10(c)	50(w); 10(c)	---	---	---

1 mg/L = milligrams per liter; PCU = photoelectric color units; SU = standard pH units; NTU = nephelometric turbidity units; TDS = total dissolved solids; TSS = total suspended solids; °C = degrees Celsius. WAD = weak acid dissociable. Standards for metals are expressed as total recoverable, except those metals that are hardness-dependent where the standard applies to the dissolved fraction (see note #3 below).

2 MCL = Maximum Contaminant Level. Numbers in brackets [ ] are mandatory secondary standards for public water systems.

3 (w) = warm water; (c) = cold water; no letter designation indicates criteria are common to both warm and cold water.

4 Parameter dependent on hardness; see NAC 445A.144 for equations to determine concentration; values in this table calculated assuming a hardness of 150 mg/L as $CaCO_3$. Example: Cadmium 1-hour average = 0.85 exp {1.128 in (hardness) – 3.828} = 0.85 exp {1.824} = 0.85 (6.2) = 5.3 μg/L = 0.0053 mg/L.

Source: Nevada Administrative Code 445A.119 and 144.

The Order III survey identifies mapping units generally named according to dominant soil series found in the unit. Mapping units along the proposed pipeline routes consist of phases of series, associations, and complexes with some miscellaneous areas, including rock outcrops.

Proposed pipeline rights-of-way generally traverse valley floors and side slopes through the majority of the routes. Soil types in these areas have developed from alluvial deposits and are characterized as moderately deep to very deep. Along upper valley slopes and along ridges and divides, soil profiles are shallower and bedrock is at or near the surface. Some leeward slopes have aeolian deposits and series, such as the Incy, have developed primarily from these materials. Additionally, soil at the north end of the Fish Springs Ranch pipeline is comprised of strongly alkaline smectitic clay associated with an adjacent Playa.

Soil in the Projects Area generally exhibits low to moderate available water holding capacity. Permeability is variable with most soil having slow to moderately slow permeability. Surface runoff varies from very slow to rapid. Approximately 14 miles of the proposed pipeline routes would occur adjacent to previously disturbed soil along the Tuscarora Natural Gas Pipeline right-of-way.

Soil that developed in alluvial valleys is generally deep to very deep (60 inches or more) and includes the Haybourne-Wedertz-Mottsville Association, Reno-Galeppi-Chalco Association, and Oest-Orr-Leviathan Association. Subsurface weak cementation is encountered on pediments, alluvial fans, and terraces in the Wedertz and Galeppi Series and hardpans occur in the Reno series soil at depth of 20 to 40 inches. The Incy series, also found in the Projects Area, formed from eolian deposits and is susceptible to wind erosion.

The Acrelane-Graufels-Glenbrook Association and Indiano-Flex-Koontz Associations are encountered on low hills and foothills. These soil types are very shallow to moderately deep and occur on moderate to steep slopes. The Acrelane and Glenbrook Series are shallow to granitic bedrock and are coarse textured with very low water holding capacity. Graufels and Indiano soil types are moderately deep (20 to 40 inches) to bedrock and generally coarse textured soil. Other shallow soil types that have developed on weathered slopes along the proposed pipeline routes include the Luppino and Terca Series.

Soil in the proposed Projects rights-of-way may be of limited value for reclamation purposes if one or more restrictive properties are present. Restrictive properties are physical or chemical characteristics that can inhibit plant growth or make the soil structurally unsound. Soil properties considered most important when determining use as salvage material include: texture, profile depth to bedrock or hardpan and coarse fragments (greater than 3 inches in diameter) in the profile. Non-soil features such as steep slopes, rough terrain, and rock outcrop may limit access for salvage activities, though these particular parameters are generally not extensive in the Projects Area.

Shallow depth to a restrictive layer is the most common limiting characteristic of soil in the Projects Area. Information on each soil series including percent of soil series included in each mapping unit, slope range, landform, depth to

induration or bedrock, rooting restricting depth (RRD), permeability, available water holding capacity (AWC), surface runoff class, hydrologic group, and erosion hazard potential is contained in the published Soil Surveys of Washoe County, Nevada (Central and South Parts). NRCS database also provided cation exchange capacity (CEC), sodium adsorption ratio (SAR), percent organic matter, percent calcium carbonate, and percent weight rock fragments.

SOIL EROSION HAZARD

The rate of erosion (undisturbed soil conditions) is dependent primarily on slope, soil surface texture, and soil surface cover. The NRCS rates suitability of in-situ soil for potential erosion hazards of water and wind. NRCS erosion hazard ratings for soil in the Projects Area are summarized in the referenced USDA Soil Surveys (USDA 1983a, 1983b).

Hazard of water erosion is slight to moderate within the Projects Area, primarily due to soil surface texture, soil surface rock fragment cover, and gentle to moderately steep slopes. Acrelane and Stodick soil are exceptions within the Projects Area due to steep slopes encountered on alluvial fans and pediments. These units exhibit high water erosion potential.

Wind erosion hazard is generally slight to moderate, primarily due to occurrence of surface rock fragments and soil surface texture that is not susceptible to blowing. Exceptions include the Incy, Haybourne and Wedertz soil types that exhibit fine sandy surface textures susceptible to transport by wind.

VEGETATION RESOURCES

The North Valleys Projects Area is contained within the southwestern portion of the Intermountain Semi-Desert Province (Bailey 1995). Vegetation in the Study Area (same as Projects Area) is typical of Great Basin plant communities, reflecting a history of livestock grazing and periodic fires. Grazing has altered the composition of vegetation by reducing density and frequency of palatable grasses and woody riparian species; whereas, fires have reduced density and spatial extent of sagebrush, juniper, and other fire-intolerant species. A mosaic of burned and unburned areas extend from the south slope of Fort Sage Mountains through Bedell Flat to the northern portion of Antelope Valley. Much of the north slope of Fort Sage Mountains is devoid of shrubs due to fire. Some burned areas have been reseeded with crested wheatgrass (*Agropyron cristatum*) (BLM 1993).

Southeastern Honey Lake Valley is dominated by sagebrush with areas of salt desert shrubs. South of Honey Lake Valley to the terminus of the proposed pipelines, vegetation is dominated by sagebrush, with scattered rabbitbrush (*Chrysothamnus* spp.) and shadscale (*Atriplex canescens*). Juniper woodlands (*Juniperus osteosperma*) occur in scattered locations between Dry Valley and Bedell Flat. Springs and seeps, although comprising a small part of the Projects Area, provide habitat conditions that support a diversity of species not found on drier upland sites. During the spring, following winter's precipitation, a diversity of annual forbs is present in all habitats.

Big sagebrush (*Artemisia tridentata*) and low sagebrush (*Artemisia arbuscula*) predominate on upland sites. Juniper woodlands occur at the upper elevations with sagebrush communities. On dry lower slopes, sagebrush communities transition to shadscale communities that are tolerant of increasing soil aridity and salinity. On basin floors, which experience seasonally high groundwater levels, the shadscale community is replaced by a black greasewood (*Sarcobatus vermiculatus*) community (BLM 1993).

SPECIAL STATUS SPECIES

BLM Transmittal Sheet (6840.06C Special Status Species Management) provides policy and guidance for conservation of special-status species of plants and animals, and ecosystems on which they depend. Special-status species include those listed under the Endangered Species Act of 1973 or species proposed or candidates for listing under this act. Special-status species also include species listed by the state as threatened or endangered or designated by the BLM State Director as sensitive. Protection is provided for sensitive species to ensure that actions authorized, funded, or carried out do not contribute to the need for the species to be listed under the Endangered Species Act of 1973. Species may be designated sensitive if it:

- Could be become endangered or extirpated from the state, or within a significant portion of its range in the foreseeable future;
- Is under status review by the U.S. Fish and Wildlife Service;
- Is undergoing significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution and/or population density is such that federal listing may be necessary;
- Typically consists of small widely dispersed populations;
- Inhabits ecological refugia or specialized unique habitats; or
- Is state-listed, but may be better conserved through application of BLM sensitive species status.

One plant species, Steamboat buckwheat, listed as endangered under the Endangered Species Act of 1973, may have potential to occur in the Projects Area. This species is known from one location in Washoe County near the city of Reno.

Review of the Nevada Natural Heritage Program database on the Internet and information presented by Morefield (2001) identifies BLM sensitive plants with the potential to occur in the Projects Area. These species are presented in **Table 3-6**.

TABLE 3-6
Endangered and BLM Sensitive Plants Known to Occur in Projects Area

Common Name	Scientific Name	Habitat
Tiehm milkvetch (sensitive)	*Astragalus tiehmii*	Whitish volcanic ash deposits weathering to deep clay soil on gentle slopes (elev. 5,280 – 5,750 feet)
Schoolcraft catseye (sensitive)	*Cryptantha schoolcraftii*	Whitish volcanic ash deposits weathering to deep clay soil (elev. 4,880 – 5,760 feet)
Crosby buckwheat (sensitive)	*Eriogounum crosbyae*	Whitish volcanic ash deposits weathering to deep clay on gentle to steep slopes (elev. 4,600 – 7,000 feet)
Steamboat buckwheat (endangered)	*Eriogonum ovalifolium var. williamsiae*	Shallow, poorly developed, dry soil derived from siliceous opaline sinter on wetland margins (elev 4,565 – 4,720 feet)
Prostrate buckwheat (sensitive)	*Eriogonum prociduum*	Basalt flows and barren volcanic tuff (elev. 4,600 – 8,320 feet)
Altered andesite buckwheat (sensitive)	*Eriogonum robustum*	Ridges, knolls, and steep slopes (elev. 4,410 – 7,325 feet) in conifer woodlands on soil derived from hydrothermal sulfide deposits
Sierra Valley mousetails (sensitive)	*Ivesia aperta var. aperta*	Benches and flats in vernally saturated meadows and seeps
Grimy mousetails (sensitive)	*Ivesia rhyparia var. rhypara*	Dry, barren outcrops or badlands of hydrothermally altered ash-fall tuff and shallow gravel (elev. 5,370 – 6,200 feet)
Webber Ivesia (sensitive)	*Ivesia webberi*	Shallow, heavy clay soils with gravelly surface over volcanic bedrock (4,000 – 5,950 feet)
Orocytes (sensitive)	*Orocytes nevadensis*	Stabilized dunes in desert saltbush communities (elev. 3,000 – 5,900 feet)
Playa phacelia (sensitive)	*Phacelia inundata*	Alkali playas (elev. 5,300 – 5,640 feet)
Altered andesite popcorn flower (sensitive)	*Plagiobothrys glomeratus*	Barren ridges and slopes (4,850 – 6,650 feet) on soils derived from weathered hydrothermal sulfide deposits
Williams combleaf (sensitive)	*Polyctenium williamsiae*	Margins and bottoms of non-alkaline seasonal lakes

Source: Nevada Natural Heritage Program 2004.

Sensitive plant surveys conducted in the Projects Area in June and July of 2004 (Westech 2004a) did not find any endangered or BLM sensitive species; however, Rams Horn Spring milkvetch (*Astragalus pulsiferae* var. *pulsiferae*), a species considered by the Nevada Natural Heritage Program to be critically imperiled due to extreme rarity, imminent threats, or biological factors was found at two locations in Bedell Flat on public land and two locations in Antelope Valley on private land. In addition, nine populations of Mojave prickly pear cactus (*Opuntia erinacea* var. *erinacea*) were found along proposed pipeline rights-of-way in Bedell Flat and Antelope Valley. Cacti are protected by Nevada state law (NRS 527.060 - 120).

INVASIVE, NON-NATIVE SPECIES

Noxious weeds are defined under Nevada law (NRS 555.005) as any species of plant that is or

is likely to be detrimental or destructive and detrimental to control or eradicate. Noxious weeds are damaging to the environment and local economy, and displace desirable vegetation. Often, noxious weeds proliferate where native vegetation has been removed or disturbed.

Forty-four species of noxious weeds have been identified in Nevada (NRS 555.101). Common species in the Projects Area include leafy spurge (*Euphorbia esula*), Scotch thistle (*Onopordum acanthium*), perennial pepperweed (*Lepidium latifolium*), musk thistle (*Carduus nutans*), spotted knapweed (*Centaurea maculosa*), Russian knapweed (*Centaurea repens*), white top (*Cardaria draba*), and Dyer's wood (*Isatis tinctoria*) (Westech 2004a). **Table 3-7** contains a list of weeds and locations observed by Westech (2004a) in the Projects Area.

TABLE 3-7
Noxious Weed Locations in Projects Area

Location (GPS UTM Coordinates)[1]	Noxious Weed[2]	Density/Abundance	Comments
11T E0249087 N4435947	Scotch thistle	Few scattered plants.	Along road and under power lines. Not abundant.
11T E0248267 N4437153	Scotch thistle	One large cluster, >30 plants.	Confined to a small area but a robust population.
11T E0250863 N4441810	Tall whitetop & Scotch thistle	Only a few plants of each species.	Tall whitetop is along drainage ditch; thistle is along road.
11T E0250962 N4441860	Scotch thistle	Several scattered clusters.	Along the drainage ditch and along the road.
11T E0251089 N4441743	Scotch thistle	Several scattered clusters.	Along road corridor adjacent to irrigated hay fields.
11T E0251486 N4441661	Tall whitetop	Large population, densities > than 50 stems per 0.01 acre.	Extensive population along road corridor and into fields.
11T E0251743 N4441695	Tall whitetop & Scotch thistle	Few plants. < 20 individual tall whitetop; several thistles.	Few tall whitetop along ditch; thistle scattered along road.
11T E0252144 N4441788	Tall whitetop	Large population; densities > than 80 stems per 0.01 acre.	Extensive population along road and into wet fields.
11T E0253013 N4442000	Scotch thistle	Few scattered plants.	Located along roadside.
11T E0258404 N4446611	Scotch thistle	One large cluster, 20 mature plants.	Found in tall vegetation along fence line with many rosettes.
11S E0258168 N4414875	Scotch thistle	A small cluster of 7 plants.	Along edge of moist flat area.
11 E0249053 N4435786	Scotch thistle & Bull thistle	Approximately 20 Scotch and 10 bull thistle.	Confined in a small area along the edge of a wetland seep.
11 E0246923 N4439662	Scotch thistle	A few plants.	Confined to a small area.

Note: In many areas it was observed that herbicide treatments had been made on some of the Scotch thistle (*Onopordum acanthium*) populations and the treatments appeared to be successful. At the time of these surveys, no apparent treatment had been made on the Tall whitetop (*Lepidium latifolium*). Along the roads within the Fish Springs Ranch portion of the proposed pipeline corridor, the Tall whitetop populations were scattered and somewhat discontinuous. Though marked at several points, this could be considered one extensive population. Bull Thistle (*Cirsium vulgare*) was marked at one location growing with Scotch thistle. Though not designated a noxious weed, it is an aggressive, invasive weed.

[1] Datum NAD 27

[2] Per Nevada Revised Statutes (NRS 555)

Source: Westech 2004a.

WETLANDS/RIPARIAN AREAS

Waters of the U.S. include wetlands and non-wetland waters of the U.S. Wetlands typically are associated with springs and wet drainages. Non-wetland waters of the U.S. are drainage channels (perennial, ephemeral, and intermittent) with a defined bank and bed.

Wetlands are regulated under Section 404 of the Clean Water Act as a subset of Waters of the U.S. Wetlands are defined as areas that are inundated or saturated by surface water or groundwater at frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (U.S. Army Corps of Engineers 1987). Jurisdictional wetlands are contiguous with interstate waters (i.e., not isolated). Isolated wetlands are not connected with interstate waters and are not jurisdictional.

Wetlands in the Study Area (same as for *Water Resources*) are associated with springs, seeps, flowing wells, playas, perennial streams, irrigation activities, and intermittent drainages. Most wetlands in the Study Area are jurisdictional marshes, wet meadows, and riparian fringes along drainages, dominated by herbaceous species (e.g., sedges, rushes, bulrushes, grasses, cattails, and non-woody plants). Some wetland have an associated shrub component composed of greasewood, coyote willow (*Salix exigua*), and salt-cedar (*Tamarix* spp.).

Wetland surveys of the Study Area (same as *Water Resources* Study Area) performed by Westech (2004a) found 58 wetlands associated with springs, flowing wells, and perennial or intermittent drainages. Springs and seeps are shown on **Figure 3-4** and a listing of these sites is presented in **Table A-1** of **Appendix A**. Twenty-nine springs and flowing wells were identified in eastern Honey Lake Valley and southern Smoke Creek Desert. Ten springs/seeps were located in Dry Valley, and 19 springs and flowing wells were identified in Bedell Flat. Water developments such as pipes, troughs, tanks, spring boxes, well casings, and fences were present at many sites. The majority of wetlands support herbaceous vegetation, frequently in combination with flowing water. Ponds were present at 14 sites, and shrub-dominated wetlands were found at four locations in northern Bedell Flat. Over one-half of the wetlands were estimated to be less than 0.1 acre in size. About one-third of wetlands were from 0.1 to 1.0 acre, and nine wetlands were from 1.0 to 10 acres. One wetland was over 10 acres. Jurisdictional wetlands associated with perennial and ephemeral drainages are present along Hay, Wilcox, Cottonwood, and Dry Valley creeks. Vegetation in these wetlands consists of willow, cottonwood (*Populus* sp.), grasses, sedges (*Carex* spp.), rushes (*Juncus* spp.), cattail (*Typha* sp.), and horsetail (*Equisetum* spp.). Those wetlands not associated with drainages likely are isolated and not jurisdictional.

Non-wetland waters of the U.S. are present as ephemeral and intermittent drainages that flow for portions of the year when there is adequate precipitation and runoff. These drainages have a defined bank and bed, but do not support vegetation adapted to wetland growing conditions. The proposed water transmission pipeline corridors would cross approximately 70 drainages (Westech 2004b), most of which are non-wetland waters of the U.S. These

drainage crossings are presented on **Figure 3-6** and described in **Table B-1** of **Appendix B**.

WILDLIFE RESOURCES

Wildlife species occupying the Study Area (same *Water Resources* Study Area – watersheds shown on **Figure 3-1**) are typically associated with sagebrush and grassland communities and juniper woodlands. Springs, seeps, and riparian areas provide important foraging and breeding habitat for aquatic as well as wide-ranging upland species. Large mammals that inhabit the Projects Area include mule deer, pronghorn antelope, coyote, mountain lions, bobcats, and badgers. Common small mammals include the black-tailed jackrabbit, mountain cottontail, white-tailed antelope squirrel, deer mice, kangaroo rats, northern pocket gopher, bushy-tailed woodrat, and least chipmunk. Numerous bat species have potential to occur in the Projects Area. Raptors include hawks, eagles, owls, and falcons. Waterfowl and shorebirds are associated with wetlands and playas of the Study Area. Upland game birds occurring in the Projects Area include sage grouse, California quail, chukar, and mourning doves. The Carson wandering skipper, an endangered butterfly, was observed in Honey Lake Valley, California; East Alkali Flat, Nevada; and Winnemucca Valley, Nevada. Suitable habitat for this species is present at additional locations, but field surveys did not locate this butterfly other than at the three previously indicated locations.

MAMMALS

MULE DEER

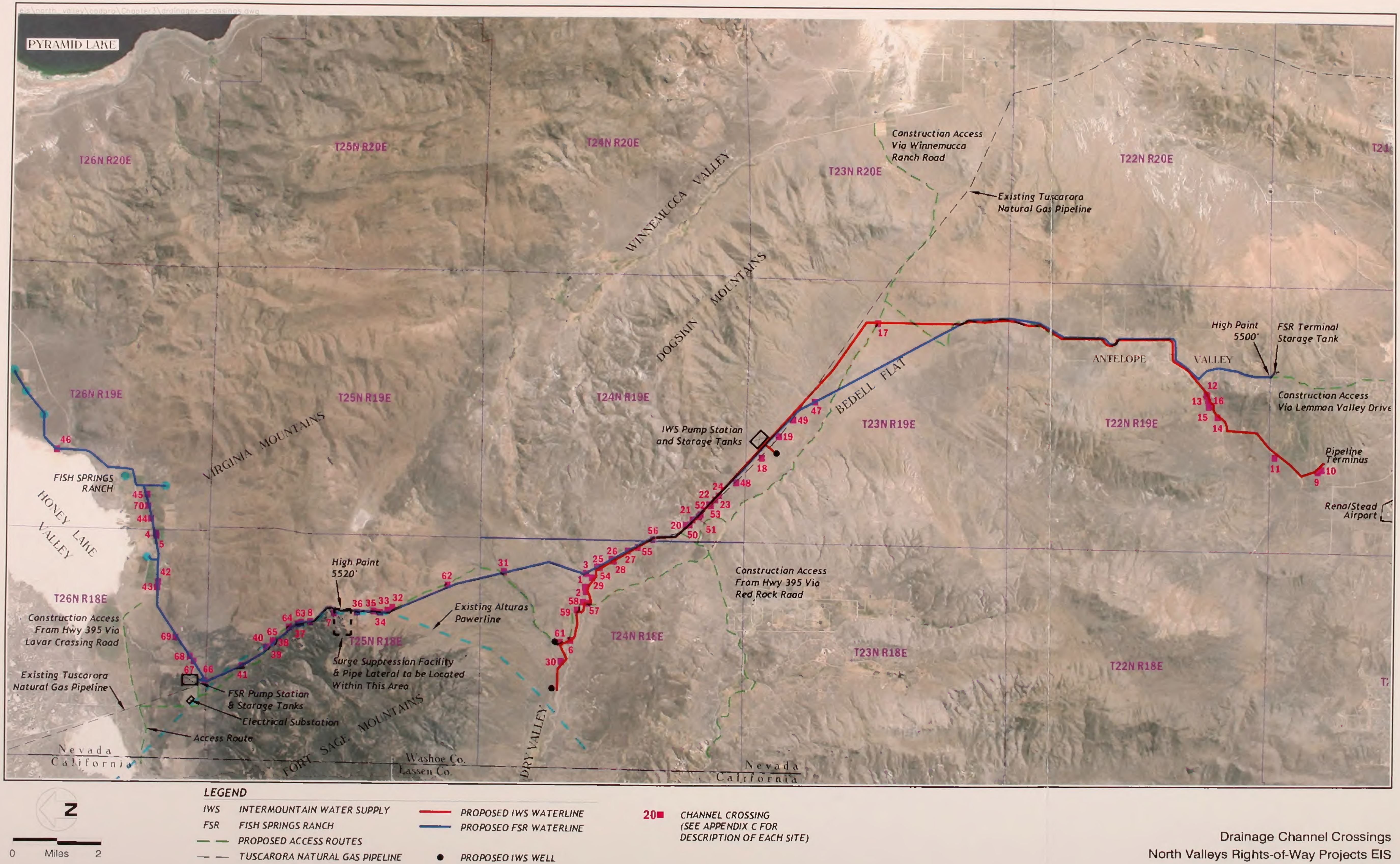
Mule deer summer and winter habitats are present at the margins of the Study Area. Mule deer winter in the Sand Hills, Dogskin Mountains, and Fort Sage Mountains and occupy higher elevations of the Virginia Mountains during the summer. The Study Area is not part of major migration corridors (BLM 1993). Winter ranges in and near the Projects Area have been degraded by fires which have reduced sagebrush, bitterbrush (*Purshia tridentata*), and other fire-sensitive shrubs that provide winter browse.

PRONGHORN ANTELOPE

Pronghorn antelope generally range throughout the Study Area. In fall and winter they are closely associated with sagebrush communities, their primary forage source. Pronghorns disperse widely throughout the region in search of succulent forbs and grasses. The limiting factor that keeps pronghorn populations relatively low in the Study Area is scarcity of succulent forbs and grasses (BLM 1993).

BATS

Twenty-three species of bats are known to occur in Nevada of which 21 are BLM sensitive species. Based on information presented by the Nevada Bat Working Group (2002), Harvey et *al.* (1999), and Butts (2004) up to 16 BLM sensitive species could be present in the Projects Area. These 16 species have been documented for Washoe County and adjacent counties. They roost in caves, mine shafts, abandoned buildings, rock crevices, cliffs, and trees and forage in woodlands, over desert washes, and riparian areas. All species forage over water and drink from open water surfaces (e.g., stock tanks, ponds, lakes, springs and wetlands).



LEGEND

IWS	INTERMOUNTAIN WATER SUPPLY
FSR	FISH SPRINGS RANCH
— —	PROPOSED ACCESS ROUTES
— —	TUSCARORA NATURAL GAS PIPELINE
— —	ALTURAS POWERLINE
——	TOWNSHIP AND RANGE
——	PROPOSED IWS WATERLINE
——	PROPOSED FSR WATERLINE
●	PROPOSED IWS WELL
●	PROPOSED FSR WELL
20■	CHANNEL CROSSING (SEE APPENDIX C FOR DESCRIPTION OF EACH SITE)

Drainage Channel Crossings
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 3-6

BIRDS

Raptors present in the Study Area include red-tailed hawk, turkey vulture, Swainson's hawk, prairie falcon, American kestrel, bald eagle, golden eagle, short-eared owls, burrowing owl, and great horned owl. These species, with the exception of burrowing owls, usually nest in trees, cliffs and rock outcrops. Red-tailed, ferruginous, and rough-legged hawks winter in the Study Area.

Other birds observed in the Study Area include western kingbird, Say's phoebe, horned lark, western meadow lark, black-throated sparrow, blue-gray gnatcatcher, common nighthawk, common raven, lark sparrow, lesser goldfinch, spotted towhee, western meadow lark, western scrub jay, loggerhead shrike, sage sparrow, Brewer's sparrow, and sage thrasher (Maxim 2004). These species nest and forage in grassland and shrub habitats.

The chukar is an introduced game bird that occupies steep terrain with perennial seeps and springs. Mourning doves nest in tall shrubs and trees, often in association with wetlands springs, and drainages. Sage grouse are obligately associated with sagebrush habitats in rolling hills and benches along drainages for nesting foraging and rearing young. Californian quail occupy riparian and sagebrush habitats with dense canopies, often in association with bitterbrush and other deciduous shrubs. All species of game bird in the Study Area visit surface water sources daily to drink. Availability of seasonal surface water is a critical factor limiting distribution and density of game birds.

Waterfowl and shorebirds nest and rest during migration at Honey Lake and associated wetlands. Several species of shorebirds and waterfowl also use seasonally flooded areas at playa lakes in eastern Honey Lake Valley. In most years these lakes are dry by summer, but in exceptionally wet years, playa lakes may remain wet and provide nesting habitats for waterfowl and shorebirds.

AMPHIBIANS AND REPTILES

Detailed searches for amphibians and reptiles have not been conducted in the Study Area; however, incidental observations (Maxim 2004) indicate the northern desert horned lizard, western rattlesnake, western terrestrial garter snake, Great Basin collared lizard, Great Basin whiptail, long-nosed leopard lizard, Nevada side-blotched lizard, and northern desert horned lizard are present. Based on distribution maps (Stebbins 1985), the following reptiles and amphibians may be present in the Study Area: Great Basin spadefoot, western toad, Pacific tree frog, northern leopard frog, common collared lizard, sagebrush lizard, desert spiny lizard, western fence lizard, western skink, western whiptail, rubber boa, striped whipsnake, western yellow-bellied racer, western patch-nosed snake, ground snake, and night snake.

FISHERIES

In the Study Area, fish occur at High Rock Spring in eastern Honey Lake Valley. Tilapia were planted in the spring and they eliminated native species. Streams with reaches of perennial flow include Hay, Wilcox, and Cottonwood creeks. These creeks support

small populations of native fish such as speckled dace (BLM 1993).

SPECIAL STATUS SPECIES

A species list for federally-listed and candidate species was received from the U.S. Fish and Wildlife Service (USFWS 2004) on March 16, 2004. Threatened, Endangered, Candidate, and BLM sensitive species known or with the potential to be present in or near the Study Area, or having suitable habitat present are listed in **Table 3-8.**

THREATENED AND ENDANGERED SPECIES

The bald eagle (threatened), Lahontan cutthroat trout (threatened), Cui-ui (endangered), and Carson wandering skipper (endangered) are species listed under the Endangered Species Act that occupy habitat or have potential to occupy habitat in or near the Study Area.

Bald Eagle

Bald eagles are present in the Study Area as transient visitors during spring and fall migrations and winter residents in Honey Lake Valley and other areas where permanent open water attracts waterfowl, an important food source for wintering eagles. Bald eagles also forage in upland sites for small mammals or feed on livestock or wildlife carrion. No bald eagle nests or roosts are known to occur in the Study Area.

Lahontan Cutthroat Trout

Lahontan cutthroat trout inhabit Pyramid Lake and spawn in the Truckee River. The original strain of Pyramid Lake Lahontan cutthroat trout became extinct in the 1940s due to diversions for the Truckee River (Sigler and Sigler 1979). Lahontan cutthroat trout were re-established in Pyramid Lake through hatchery propagation of strains from Summit, Walker, and Heenan lakes. The Derby Dam is a barrier to upstream spawning runs of Lahontan cutthroat trout. No Lahontan trout or their habitat are present in the Study Area outside of Pyramid Lake.

Cui-ui

The Cui-ui is a large plankton-feeding, lake-dwelling sucker that traditionally spawned in the Truckee River in shallow gravel beds. Populations of cui-ui have declined through disruption of their reproductive cycle due to reduce flows in the Truckee River and declining water levels in Pyramid Lake resulting from water diversions. In some years, river flow has been insufficient to allow passage of Cui-ui to spawning sites (BLM 1993). Cui-ui live more than 40 years, which has allowed the species to persist for many years with sporadic reproduction and recruitment to the population.

Carson Wandering Skipper

The Carson wandering skipper, a small orange butterfly, is known from three populations: Honey Lake Valley, California; Winnemucca Valley, Nevada; and near Carson City, Nevada. A single Carson wandering skipper was observed at Alkali Flat, eastern Honey Lake Valley, Nevada (Sanford 2004a); however, it is not known if this location supports a viable population.

TABLE 3-8
Status of Threatened, Endangered and BLM Sensitive Species that May Occur On or Near Study Area

Species	Status	Habitat
Mammals		
Western small-footed myotis (*Myotis ciliolabrum*)	BLM sensitive; Documented from Washoe, Churchill, Pershing, and Douglas counties.	Forages along cliffs and rocky slopes and sometimes over water. Roosts/breeds in rock crevices, talus, caves, mine adits, abandoned buildings,
Big brown bat (Eptisicus fuscus)	BLM sensitive; Documented in Washoe, Churchill, Pershing, and Douglas counties	Roosts in caves, mine shafts, trees, bridges, and buildings; forages over water and in woodlands
Fringed myotis (*Myotis thysanodes*)	BLM sensitive; documented in Washoe, Pershing, and Churchill counties	Forages in desert scrub and pinon-juniper woodlands; breeds and roosts in mines, building, rock crevices, caves and under tree bark
California myotis (*Myotis californicus*)	BLM sensitive; Documented in Washoe, Churchill, and Pershing counties	Roosts in caves, crevices , talus, trees, bridges, and buildings; forages over water, and in desert washes, and woodlands
Little brown myotis (*Myotis lucifugus*)	BLM sensitive; Documented in Washoe and Churchill counties	Prefers to forage over water. Usually hibernates in caves and mines, often roosts and breeds in buildings.
Western long-eared myotis (*Myotis evotis*)	BLM sensitive; Documented in Washoe and Churchill counties	Roosts in trees, caves, buildings, under bridges, crevices; forages over water and in woodlands
Yuma myotis (Myotis yumanensis)	BLM sensitive; Documented in Washoe, Churchill, Pershing, and Douglas counties	Roosts in trees, caves, mine shafts, cliffs, crevices, abandoned buildings, and under bridges; forages over water
Long-legged myotis (*Myotis volans*)	BLM sensitive; Documented in Washoe, Churchill, Pershing, and Douglas counties	Roosts in trees, caves, mine shafts, cliffs, crevices, abandoned buildings, and under bridges; forages over water
Hoary bat (*Lasiurus cinereus*)	BLM sensitive; Documented in Washoe and Churchill counties	Roosts in trees, cliffs, mines, caves, and talus; forages over water and in woodlands
Pallid bat (*Antrozous pallidus*)	BLM sensitive; Documented in adjacent Churchill and Pershing counties	Roosts in cave, mine shafts, bridges, buildings, and trees; forages in woodlands, over water, and desert washes
Spotted bat (*Euderma maculata*)	BLM sensitive; Documented in Washoe County	Roosts in caves, crevices , talus, trees, bridges, and buildings; forages over water, and in desert washes, and woodlands
Silver-haired bat (*Lasionycteris noctivagans*)	BLM sensitive; Documented in Washoe, Churchill, and Pershing counties	Roosts in trees, caves, mine shafts, bridges, and buildings, and forages over water and in woodlands
Western red bat (Lasiurus blossevillii)	BLM sensitive; Documented in Washoe and Churchill counties	Roosts in trees; forages over water and in woodlands
Spotted bat (*Euderma maculatum*)	BLM sensitive; Documented in Washoe County	Low deserts to montane forests with rock outcrops and cliffs. Forages over water and among trees
Townsend's big-eared bat (*Corynorhinus townsendii*)	BLM sensitive; Documented in Project area and adjacent Churchill and Pershing counties	Roosts and breeds mines, caves, and under bridges; returns yearly to same roost sites.
Western pipistrelle *Pipistrellus hesperus*	BLM sensitive; Documented in Washoe, Churchill, Pershing, and Douglas counties	Roosts in trees, caves, abandoned buildings, and under bridges; forages over water and desert washes, and in woodlands

TABLE 3-8 (continued)
Status of Threatened, Endangered and BLM Sensitive Species that May Occur On or Near Study Area

Species	Status	Habitat
Brazilian free-tailed bat (*Tadaria braziliensis*)	BLM sensitive: Documented in Washoe and Churchill counties	Roosts in trees, caves, abandoned buildings, and under bridges; forages over water and desert washes, and in woodlands
Pygmy rabbit (*Brachylagus idahoensis*)	BLM sensitive; Not documented in Projects Area, but suitable habitat is present.	Relatively tall, dense big sagebrush communities with deep soils suitable for establishing burrows
Preble's shrew (*Sorex preblei*)	BLM sensitive, not documented in Projects Area, but suitable habitat may be present	Sagebrush, grassland, riparian habitats and marshy areas
	Birds	
Bald eagle (*Haliaeetus leucocephalus*)	Threatened/BLM sensitive, may occasionally be present in Projects Area during winter.	Periodic seasonal migrant in winter, present near open water where favored prey (waterfowl and fish) are present or where carrion is available. Common winter visitors around Honey Lake Valley.
Sage grouse (*Centrocercus urophasianus*)	BLM sensitive; two leks present in vicinity of proposed rights-of-way; not active in 2004	Sage brush habitat and wet meadows and riparian areas for brood rearing
Northern goshawk (*Accipiter gentilis*)	BLM sensitive, not known to nest in Projects Area; Suitable nesting habitat not present.	Nests in aspen stands, usually near streams
Ferruginous hawk (*Buteo regalis*)	BLM sensitive; Not known to nest in Projects Area, rarely nests in western Nevada. Limited potential nesting in Project area.	Prefers to nest at interface of pinon-juniper zone and desert shrub communities
Swainson's hawk (*Buteo swainsoni*)	BLM sensitive; Limited nesting habitat present in Projects Area.	Nests in deciduous trees and shrubs in riparian areas or around springs
Burrowing owl (*Athene cunicularia hypugaea*)	BLM sensitive; Not known to nest in Projects Area, but habitat may be present	Nests in grasslands and shrublands, often in association with ground squirrels and badgers, which excavate burrows it uses for nesting
Western snowy plover (*Charadrius alexandrinus nivosus*)	BLM sensitive; Habitat present in around Honey Lake and other playas.	Shorelines of alkaline lakes and playas
Black tern (*Chlidonias niger*)	BLM sensitive; Habitat present near Projects Area in the Honey Lake Valley	Freshwater marshes and sloughs
Western yellow-billed cuckoo (*Coccyzus americanus occidentalia*)	BLM sensitive/ federal candidate for listing; Habitat not present in Projects Area	Riparian woodlands with dense thickets of shrubs and trees
Flammulated owl (*Otus flammeolus*)	BLM sensitive, nesting and foraging habitat not present in Projects Area	Mountain pine forests
White-faced ibis (*Plegadis chihi*)	Proposed BLM sensitive; nesting and foraging habitat present in wetlands at Honey Lake; wetlands near Projects Area not large enough to support breeding	Large wetlands and riparian areas with emergent vegetation
Mountain quail (*Oreortyx pictus*)	BLM sensitive; not present in the Projects Area.	Conifer forest, chapparal, and pinon-juniper woodlands
	Reptiles	
Sierra alligator lizard (*Elgaria coerulea palmeri*)	BLM sensitive; documented in Washoe County	Generally inhabits woodland and forest, but occasionally found in grassland and sagebrush habitats

TABLE 3-8 (continued)
Status of Threatened, Endangered and BLM Sensitive Species that May Occur On or Near Study Area

Species	Status	Habitat
Fish		
Lahontan cutthroat trout (*Onchorynchus clarki henshawi*)	Threatened/BLM sensitive; not present in Projects Area. Present in Pyramid Lake and the Truckee River	Lake dwelling trout that spawns in flowing fresh water
Cui-ui (*Chasmistes cujus*)	Endangered/BLM sensitive; not present in Projects Area. Endemic to Pyramid Lake, spawning in the Truckee River	Lake dwelling sucker that spawns in flowing fresh water
Invertebrates		
California floater (*Anodonta californiensis*)	BLM sensitive, not present in Projects Area	Rivers with fish
Fly Ranch Springsnail (*Pygulopsis bruesi*)	BLM sensitive; not present in Projects Area	Fly Ranch thermal springs near Gerlach, Nevada
Carson wandering skipper (*Pseudocopaedodes eunus obscurus*)	Endangered/BLM sensitive; present near Honey Lake; currently known from three populations: Carson City, NV, Winnemucca Valley, NV and Honey Lake Valley, CA. A single Carson wandering skipper was observed at Alkali Flat, NV (Sanford 2004a). Although not recorded at these locations, suitable Carson wandering skipper habitat is present near Fish Springs Ranch, Smoke Creek Desert, Bedell Flat, and Dry Valley (Sanford 2004a).	Feeds on flower nectar and lays eggs exclusively on salt grass. Larvae feed on salt grass.
Carson valley silverspot (*Speyeria nokomis carsonensis*)	BLM sensitive; species not observed/identified during surveys of Projects Area (Sanford 2004b).	Once present along the Carson River in Douglas County; currently restricted to a small population in Douglas County
Mono checkerspot (*Euphydryas editha monensis*)	BLM sensitive; documented in Washoe County; species not observed/identified during surveys of Projects Area (Sanford 2004b).	Riparian habitats on east side of Sierra Nevada Range; distribution centered in Mono County, California
Carson valley wood nymph (*Cercyonis pegala carsonensis*)	BLM sensitive; species not observed/identified during surveys of suitable habitat in Projects Area (Sanford 2004b).	Wetlands and riparian areas; requires grasses or sedges as host plants; little is known about its ecology (Sanford 2004b).

Source: Harvey et *al.* 1999; Erhlich et *al.* 1988; Sibley 2001; Nevada Bat Working Group 2002; Herron et *al.* 1985; Nevada Natural Heritage Program 2004; Sanford 2004a, 2004b.

The Carson wandering skipper feeds on nectar from flowers and lays its eggs on salt grass, the obligate host of the butterfly's larvae (Brussard *et al* 1999). Suitable habitat (i.e., wetlands supporting salt grass and nectar-producing flowers) appear to be present near the Fish Springs Ranch Project Area in Nevada at Dry Valley, Smoke Creek Desert, Bedell Flat, and Alkali Flat; however, no Carson wandering skippers were found at these locations during surveys conducted by Sanford (2004a) and Westech (2004a). These sites have salt grass

habitat maintained by springs, seeps, and/or flowing wells.

These potential habitat areas for Carson wandering skipper identified by Sanford (2004a) and Westech (2004a) are shown on **Figure 3-7**. The Carson wandering skipper has been observed at three locations in the Study Area: South Bay of Honey Lake at the western side of the Honey Lake Valley Study Area; East Alkali Flat near Fish Springs Ranch; and in the Winnemucca Valley near Winnemucca Ranch Road (**Figure 3-7**). The location in Winnemucca Valley has been designated as an Area of Critical Environmental Concern (ACEC) because it supports the Carson wandering skipper and has potential to provide important habitat to support viable populations of this species. BLM is acquiring private land, contiguous with public lands, to protect Carson wandering skipper habitat in the Winnemucca Valley. Current threats to the Winnemucca Valley population include encroaching development and drawdown of the water table from an increased number of domestic wells (Brussard *et al.* 1999).

Sanford (2004b) also surveyed the Study Area for two special status butterfly species: Carson Valley wood nymph and Carson Valley silverspot. These butterfly species, however, were not found during the August 2004 survey.

SENSITIVE SPECIES

The following section addresses only sensitive species that are known or may be present in the Study Area.

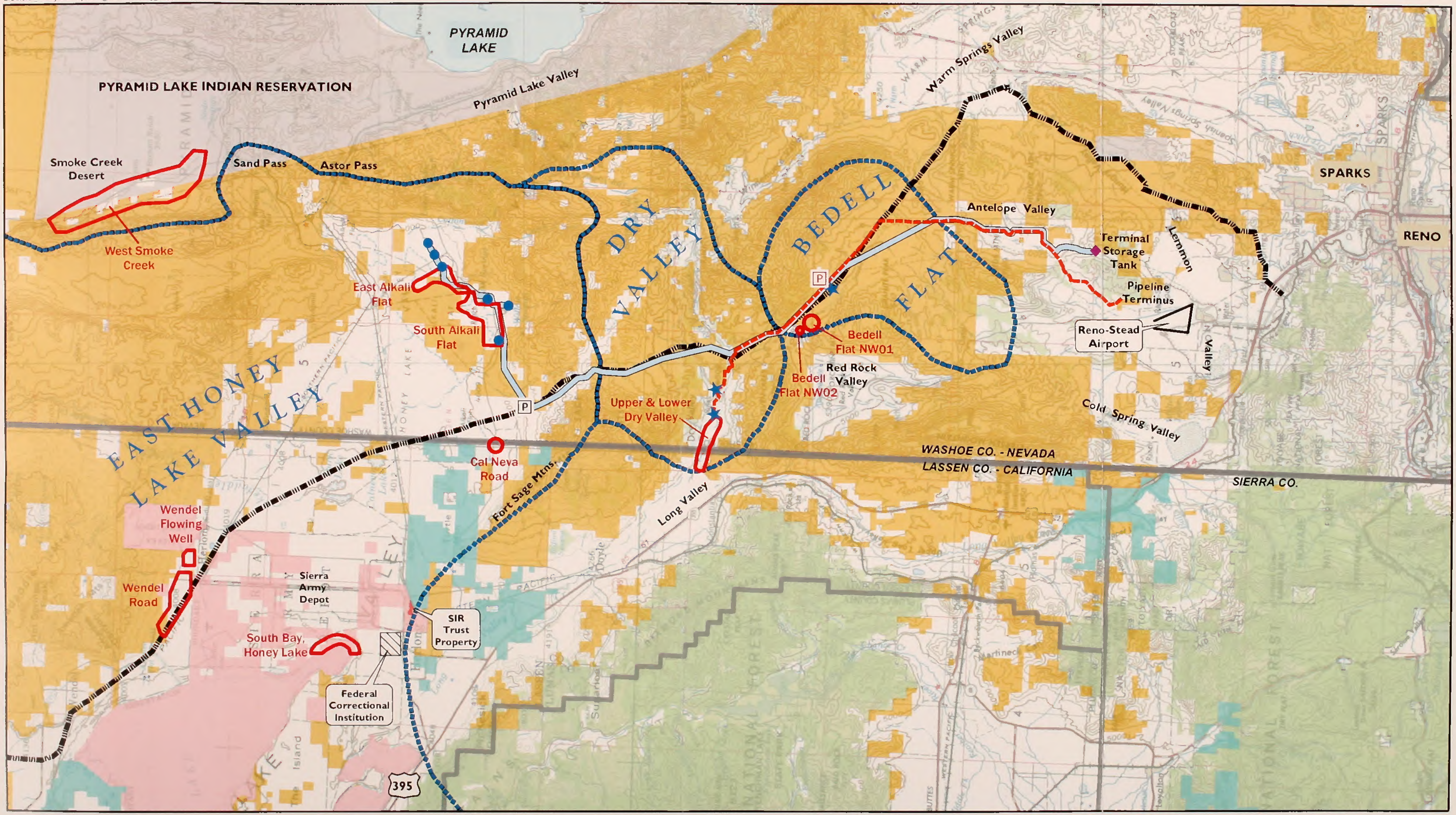
Bats

Most of the bat species listed in **Table 3-8** have the potential to use habitats of the Study Area for foraging, roosting, and breeding. Wetlands and water associated with springs and seeps, sagebrush grasslands, juniper woodlands, and rocky outcrops may provide habitat for some or all bat species listed as sensitive in **Table 3-8.** Rock crevices may provide roosting habitat and marginal breeding habitat. Caves, mines, and abandoned buildings optimum for roosting and breeding for colonies of bats have not been documented in the Study Area.

Water sources are critical to bats because they drink from open water, and insects are more abundant around wetlands and open water. Studies in desert habitats have found that bat activity is 40 times greater near wetlands and riparian areas than in upland areas (Nevada Bat Working Group 2002). Even high-elevation tree roosting bats fly to open water, wetlands, and riparian areas to drink and forage.

Species of bats with potential to occupy habitat in the Study Area vary in the degree to which their populations and habitats are at risk. According to the Nevada Bat Working Group (2002), species at high risk are the fringed myotis, western red bat, and Townsend's big eared bat (**Table 3-9**).

EIS\north_valley\arcmap\draft_eis\wandering_skipper.mxd



Note: Data for Nevada are from the Bureau of Land Management Geographic Information System database.

0 Miles 5

Intermountain Water Supply, Inc.
- Proposed Pump Station
- Proposed Production Well
- Proposed Pipeline Route

Fish Springs Ranch, LLC
- Proposed Terminal Tank
- Proposed Production Well
- Proposed Pump Station
- Proposed Pipeline Route

Public Ownership
- Bureau of Indian Affairs
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense (Sierra Army Depot)
- Forest Service
- State of California
- Susanville Indian Ranchera (SIR)

- Tuscarora Natural Gas Pipeline
- Watershed Boundary
- Potential Habitat for Carson Wandering Skipper

Carson Wandering Skipper Habitat
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 3-7

TABLE 3-9
Conservation Status of Bats Potentially Present in Study Area

Species	Populations/Habitats at Risk
Pallid bat	Moderate
Townsend's big-eared bat	High
Big brown bat	Low
Spotted bat	Moderate
Silver-haired bat	Moderate
Western red bat	High
Hoary bat	Moderate
California myotis	Moderate
Small-footed myotis	Moderate
Long-eared myotis	Moderate
Little brown myotis	Moderate
Fringed myotis	High
Long-legged myotis	Low
Yuma myotis	Moderate
Western Pipistrelle	Moderate
Brazilian free-tailed bat	Low

Source: Nevada Bat Working Group 2002.

Pygmy Rabbit

Pygmy rabbits prefer areas of relatively tall, dense sagebrush with deep soil suitable for excavating burrows. Sagebrush is the primary food of pygmy rabbits, but they also eat grasses and forbs depending on the seasonal availability. In Nevada, pygmy rabbits are generally found in sagebrush-dominated broad valley floors, stream banks, alluvial fans, and other areas with friable soil. Surveys conducted on public land in the Study Area for pygmy rabbits, pygmy rabbit burrows, and fecal deposits did not find indications that they are present (Maxim 2004).

Preble's Shrew

The ecology, life history, and habitat characteristics of Preble's shrew are poorly known (Foresman 2001; Clark and Stromberg 1987); however, over its range, it has been found mostly in sagebrush and grassland habitats and occasionally in coniferous forest, marshes, and riparian areas. Suitable habitat appears to be present in the Study Area and the species has been documented to be present in Washoe County (Nevada Natural Heritage Program 2004).

Sage Grouse

Sage grouse forage and nest in the Study Area. Sage grouse are obligately linked to sagebrush which is their primary food in fall and winter. In spring and summer, sage grouse also feed on herbaceous vegetation and insects. Wetland and riparian areas are important brood-rearing areas for sage grouse. In spring sage grouse visit communal courtship areas known as leks for breeding. Two historic leks are located in

Bedell Flat; however, these leks were inactive in 2004 (Espinosa 2004). Sage grouse have also been documented in the Sand Hills and Virginia Mountains, on the margin of the Study Area (BLM 1993). Fires have greatly reduced sage grouse habitat in the Study Area. Fires, in conjunction with the scarcity of mountain meadow habitat for chick rearing, are the major factors limiting sage grouse populations in the Study Area.

Swainson's Hawk

Swainson's hawks are seasonal residents and nesters in the Study Area, migrating to South and Central America in winter (Ryser 1985). This hawk nests in clumps of trees, often in agricultural and riparian areas or near springs. Swainson's hawks feed mostly on large insects and small mammals; however, they will also take bats, birds, and amphibians. This hawk is present in Honey Lake Valley and may nest in cottonwood trees near ranches and scattered juniper trees in the southern part of the valley (BLM 1993).

Burrowing Owl

Burrowing owls nest in underground burrows excavated by ground squirrels, badgers, and other mammals; however, they are also able to excavate their own burrows. They usually occupy sagebrush and grassland habitats. The same nesting burrow may be used for a number of years. Although burrowing owls can often be seen perched on or near their burrow during the day, they forage at night for nocturnal small mammals, spadefoot toads, and insects. Burrowing owls usually migrate south from Nevada in winter, but there are records of them over-wintering in their burrows in a state of torpor (Ryser 1985).

Black Tern

Black terns feed mainly on insects and require dense emergent vegetation in freshwater marshes and wetlands for nesting (Erlich *et al.* 1988). It nests in Honey Lake Valley in extensive wetlands at the north end of Honey Lake. Nesting habitat for black terns may also be present at Bonham Ranch in Smoke Creek Desert and Spanish Springs Valley, but no nesting terns have been confirmed (BLM 1993).

Western Snowy Plover

Populations of the western snowy plover breed at shallow alkaline lakes and playas in the interior West including Honey, Duck, and Calneva lakes near the Study Area. They nest on sparsely vegetated shorelines on alkaline sand and gravel. There appears to be little potential for plover nesting habitat within the Study Area (BLM 1993).

ACCESS AND LAND USE

The area to be traversed by the proposed water transmission pipelines between Lemmon Valley in the south and eastern Honey Lake Valley in the north is public land administered by BLM. Small private tracts occur in Dry Valley and northeastern Red Rock Valley (adjacent to Bedell Flat). The proposed Fish Springs Ranch pipeline would cross Fish Springs Ranch which owns land along the north flank of Fort Sage Mountains. Principal access routes to the proposed pipeline alignments would be via the pump station in the north, U.S. Highway 395

and Red Rock Road from the west, Winnemucca Ranch Road from the east, and Lemmon Valley Drive and Antelope Valley Road from the south (**Figure 2-1**). Road designations, routes, and land tracts encompassing the Proposed Projects described above constitute the Study Area for *Access and Land Use*.

NORTH VALLEYS PLANNING AREA

The North Valleys Planning Area consists of approximately 152,240 acres, of which 14,385 acres have been developed. The prospect for additional suburban development in the North Valleys area is limited by the fact that groundwater resources in the Planning Area are appropriated (Washoe County Department of Community Development 2003). Any proposed subdivisions would need to obtain water rights from elsewhere or secure rights to conservation surpluses in order to be approved.

Land use in Lemmon Valley consists of low- and medium-density suburban development (one to three dwelling units per acre), and low- and medium-density rural (one dwelling unit per 5 to 10 acres). Antelope Valley is an established area designated as low density rural residential (one dwelling unit per 10 acres).

Industrial and commercial development in the North Valleys area is generally located along the U.S. Highway 395 corridor. Conversion of residential to industrial land uses south of Stead, between U.S. 395 and Old U.S. 395 is also occurring.

Reno-Stead Airport encompasses 760 acres and is the major industrial land use in the North Valleys Planning Area. The airport currently functions as a regional general aviation airport and is also used by the Nevada Army National Guard. Existing facilities include two runways, numerous hangars, air tanker services, control tower, and support facilities (Jeff Codega Planning Design, Inc 2000). The Airport Authority of Washoe County (AAWC) owns approximately 5,045 acres (within the City of Reno boundary) surrounding the Reno-Stead Airport and plans to develop 4,737 acres as a business/industrial park and 308 acres to remain as undeveloped land.

A Planned Unit Development outside of the Reno-Stead Airport boundary has been approved that includes nine new development parcels, including over 1,000 acres required as safety zones in the area currently used by the Reno Air Race Association. Approximately 2,000 acres (1,146 acres in actual buildings) will be developed with another 528 acres used for recreation, parks, and buffer zones (Jeff Codega Planning Design, Inc. 2000). At present, there is low demand for the space and Reno-Stead Airport is not advertising and has no prediction about when build-out would occur (Schultz 2004). The 2002 Truckee Meadows Regional Plan, as amended February 2003, notes that Stead is anticipated to become a regional and major employment center.

HIGH DESERT PLANNING AREA

The High Desert Planning Area adjoins the North Valleys Planning Area on the north and comprises 4,408 square miles in the northern

two-thirds of Washoe County. Predominant land use in the Planning Area is designated as general rural and includes over 2.6 million acres of public land used for open space, agriculture, and grazing. General rural designation includes public land, land with severe development constraints, land that should be preserved for conservation purposes, or land that is not planned to receive services and facilities needed for development.

The California-Nevada state line bisects Honey Lake Valley. The Nevada portion lies in the southernmost extension of the High Desert Planning Area. Land use in the area is primarily agriculture and grazing. Residential dwelling units are generally one per 40 acres. The U.S Army operates the Sierra Army Depot on the California side of Honey Lake Valley. The Depot is used for storage and disposal of ammunition. A Federal Correction Institution and Doyle Wildlife Range are also located in the California portion of Honey Lake Valley.

BLM AUTHORIZATIONS

Land use authorizations, rights-of-way, or other improvements in the Study Area are listed in **Table 3-10.** These include access roads, natural gas pipeline and electrical distribution powerline rights-of-way, and a water transmission pipeline right-of-way.

GRAZING MANAGEMENT

The proposed pipeline rights-of-way would cross all or portions of five grazing allotments. Allotment names, number, area, permitted animal unit months (AUMs), schedule, and permittees are shown in **Table 3-11.**

RECREATION

Dispersed, undeveloped recreation is the predominant type of outdoor recreation in the Study Area. The Study Area for recreation encompasses the same land tracts, roads, and routes described previously in *Access and Land Use*. These areas are mostly public land administered by BLM and frequently used for organized and dispersed recreational activities and events. The general area provides open space for diverse recreational activities such as hunting, hiking, mountain biking, horseback riding, and off-highway vehicle (OHV) use. Recreational shooting occurs at several locations and is not specifically restricted. Other users of the area must be vigilant in areas used for target and skeet shooting (BLM 2001b).

Off-highway vehicle use is the most popular form of recreation in the Study Area due to its proximity to the Reno-Sparks metropolitan area and the network of roads and trails throughout the mountains and valleys. Dispersed, non-motorized, and semi-primitive recreational opportunities are located in Petersen Mountain, Red Rock Scenic Area, Fred's Mountain, Pah Rah Range, and Incandescent Rocks Area of Critical Environmental Concern (ACEC) in the Virginia Mountains.

TABLE 3-10 Rights-of-Way Within or Adjacent to Study Area					
Serial Number	Holder	Type	Location	Dimension (feet)	
				Length	Width
Fish Springs Ranch Application N-76800					
N-28605	Red Rock Estates	Road	Sections 1, 2 T22N, R19E	Varying by section	66 ft.
N-57450	Tuscarora Gas Co.	Natural Gas Pipeline	Sections. 4, 5, 9, 10, T23N, R19E	Varying by section	100 ft.
N-28605	Red Rock Estates	Road	Section 36, T23N, R19E	2024 ft.	66 ft.
N-57450	Tuscarora Gas Co.	Natural Gas Pipeline	Sections 1, 12, 13, 24, T24N, R18E	Varying by section	100 ft.
N-57450	Tuscarora Gas Co.	Natural Gas Pipeline	Sections 19, 30, 31, 32, T24N, R19E	Varying by section	100 ft.
N-57450	Tuscarora Gas Co.	Natural Gas Pipeline	Sections. 3, 4, 10, 14, 23, 26, 35, 36, T25N, R18E	Varying by section	100 ft.
N-27350	Sierra Pacific Power Co.	Electric Transmission Line	Sections. 3, 4, 14, 23, T25N, R18E	Varying by section	Varying
N-42346	Fish Springs Ranch	Water Pipeline	Section 26, T26N, R18E	3,000 ft.	12 ft.
N-51491	Fish Springs Ranch	Well Site/Access Road	Section 26, T26N, R18E	Well Site: 130 ft. Road: 500 ft.	Well Site: 70 ft. Road:15 ft.
Intermountain Water Supply Application N-76897					
N-57450	Tuscarora Gas Co.	Natural Gas Pipeline	Sections 13, 24 T24N, R18E	Varying by section	100 ft.
N-34321	J. and C. Richardson	Access Road	Section 8, E½ NE¼, T21N, R19E	1,460 ft.	50 ft.
N-28605	Red Rock Estates	Access Road	Section 36, T23N, R19E	2,024 ft.	66 ft.
N-57450	Tuscarora Gas Co.	Natural Gas Pipeline	Sections 4, 5, 9, 10, 11, 13, 14, T23N, R19E	Varying by section	100 ft.
N-57450	Tuscarora Gas Co.	Natural Gas Pipeline	Sections 19, 30, 31, 32, T24N, R19E	Varying by section	100 ft.

Source: Nelson 2004.

TABLE 3-11 Grazing Allotments in Study Area				
Allotment	Area (acres)	Animal Unit Months	Grazing Season	Permittee
Antelope Mountain #3001	53,755	6,362	April 15 – Oct. 31	D.S. Ranches Fernley, NV
Constantia #3012	19,121	1,246	April 1 – Nov. 30	Mapes Ranch Standish, CA
Flanigan #3022	56,079	3,815	Dec. 1 – Sept. 30	Fish Springs Ranch Carson City, NV
Red Rock #3014	3,560	454	April 15 – Oct. 31	D.S. Ranches Fernley, NV
Winnemucca Ranch #3059	43,457	3,483	June 1 – Oct. 31	Winnemucca Ranch Reno, NV

Source: Nelson 2004.

Organized events on public land require coordination with BLM and issuance of a Special Recreation Permit. Therefore, location and timing of events is often planned to minimize user conflict and to manage impact of those activities on the environment.

The following organized recreational activities occur on public land administered by BLM within the Study Area or in the vicinity of the proposed pipeline rights-of-way:

- Motorcycle races occur approximately four to six times per year at the Lemmon Valley Motocross Track at the north end of Lemmon Valley. The Hungry Valley OHV Area encompasses about 40,000 acres and hosts two to three motorcycle races a year.

- Hunting dog field trials occur during spring and fall in Hungry Valley and in the Cold Springs area. Approximately 20 to over 100 participants compete at the field trials. Dog trials require large tracts of unobstructed land, and participants use horses to cover distances with the dogs.

- Equestrian events in the vicinity of the Projects Area include four to six organized endurance races each year. These events cover 100 miles and include portions of the Projects Area.

- The Red Rock Hounds, Inc. conduct English style "fox" hunts (except they chase coyotes) from mid-September through March in the Sand Hills, Bedell Flat, and Hungry Valley areas. These chases require large open areas where participants run little risk of conflicting with other activities; particularly motorized sports. Organized coyote chasing may include over 100 participants with horses and dogs.

- During June, the Reno Rodeo Cattle Drive goes from Doyle, California through Dry Valley, Bedell Flat, and Hungry Valley to Reno, Nevada (Knight 2004).

The Reno-Stead Airport has been the site of National Championship Air Races and Air Show since 1965. The show is staged annually in September and draws over 200,000 visitors and spectators (BLM 2003).

HUNTING

Hunting in the Study Area is within NDOW Unit 021 of Area 2. Mule deer hunting in Unit 021 occurs over a 3-week period in December with a 1-week season for pronghorn antelope in late August and early September. In 2003, 20 permits for mule deer and 13 permits for pronghorn antelope were issued in Unit 021. Hunter success ranged from 55 percent for mule deer to 69 percent for pronghorn antelope.

Hunting of quail and chukar extends from mid-October through January. Hunting Unit 021 is closed to hunting of sage grouse.

NOISE

Ambient noise of a given environment is the all-encompassing sound associated with that environment, and is due to a combination of noise sources from many directions - near and far. Existing ambient noise levels in the Study Area are a combination of noise due to animals, insects, human activities, vehicles, and aircraft.

The Study Area for noise includes areas within normal hearing distance of the proposed pipeline rights-of-way and associated components. Existing ambient noise levels in the Study Area are typical for a rural setting.

Typical existing day-night average noise level (L_{dn}) in residential areas, such as Lemmon and Antelope valleys, range between 40 and 45 dBA, similar to levels for typical rural residential areas. In quiet areas, with limited activities, such as sparsely developed areas in Honey Lake Valley, Dry Valley, and Bedell Flat, ambient noise levels would likely range between 30 and 40 dBA. **Table 3-12** shows typical outdoor ambient noise levels for several types of residential areas.

The L_{dn} is a single number descriptor that represents constantly varying sound level during a continuous 24-hour period. The L_{dn} includes a 10 dBA penalty added to noise occurring between 10:00 p.m. and 7:00 a.m. The penalty is used to account for increased annoyance caused by noise levels at night. The *1996 Washoe County Development Code, Article 414–Noise and Lighting Standards* determines maximum allowable noise levels in terms of L_{dn} values. **Table 3-13** summarizes applicable maximum noise levels allowed by Washoe County Code.

Noise generated by trucks, bulldozers, and other equipment generally ranges from 90 to 100 dBA at the source. For comparison **Table 3-14** lists various noise sources and the range of dBA associated with these noises.

TABLE 3-12
Typical Outdoor Ambient Noise Levels

Approximate L_{dn}	Description
55-60 dBA[1]	Urban residence
45-50 dBA	Suburban residence on outskirts of city
45-50 dBA	Small town residence
40-45 dBA	Rural residence
30-40 dBA	Undeveloped or sparsely developed land

[1] dBA = A-weighted decibel sound scale

Source: Handbook of Acoustical Measurements and Noise Control 1998.

TABLE 3-13
Washoe County Maximum Allowable Noise Levels

Condition	Allowable L_{dn} at Property Line	Description
A	75 dBA	Industrial development within an industrial zone.
B	65 dBA	Property abutting residential development.
C	65 dBA	Property abutting public/quasi-public facilities, such as parks, schools, hospitals, and group and child care facilities.

Source: Washoe County Development Code 1996.

TABLE 3-14
Relative Scale of Various Noise Sources

Noise Level (dBA)[1]	Common Indoor Noise Levels	Common Outdoor Noise Levels
110	Rock band	
105		Jet flyover @ 1000 feet.
100	Inside New York subway train	
95		Gas lawn mower @ 3 feet.
90	Food blender @ 3 feet	
80	Garbage disposal @ 3 feet., Shouting @ 3 feet	Noisy urban daytime
70	Vacuum cleaner @ 10 feet	Gas lawn mower @ 100 feet.
65	Normal speech @ 3 feet	Commercial area, heavy traffic @ 300 feet.
60	Large business office	
50	Dishwasher in next room	Quiet urban daytime
40	Small theater, large conference room	Quiet urban nighttime
35		Quiet suburban nighttime
33	Library	
28	Bedroom @ night	
25	Concert hall (background)	Quiet rural nighttime
15	Broadcast and recording studio	
5	Threshold of hearing	

[1] dBA = A-weighted decibel sound scale.
Source: Hatano 1980.

VISUAL RESOURCES

Objectives of the visual resource investigation are to identify and describe visual resources that could be affected by the proposed pipeline rights-of-way and associated structures. Visual resources include landscapes that may be viewed during activities such as travel and recreation. The Study Area for visual resources is defined by location of Key Observation Points (KOPs) and resultant viewsheds as selected through BLM's Visual Resources Management system guidance.

The proposed water transmission pipelines would extend from southeastern Honey Lake Valley and central Dry Valley in the north through Bedell Flat and Antelope Valley to the south. This area consists of north-south trending mountain ranges from 4,200 feet amsl at valley floor to over 7,000 feet amsl at ridgeline. Sparsely vegetated hills of sagebrush and dry valleys in varying shades of tan and beige characterize the area. At higher elevations, juniper trees color the landscape with darker shades of green. Dry washes meander through the Study Area. Sandy soil and rock are exposed in all areas due to sparse vegetation. Surface color ranges from light tan to darker shades of tan or beige. Vegetation colors range from tan to green (seasonal).

The proposed Projects can be viewed from several different locations and angles. Most locations are lightly traveled recreation trails or ranch roads that extend through the valleys.

The most notable exception would be the pipeline terminus areas that can be viewed at distance from U.S. Highway 395.

VISUAL RESOURCE MANAGEMENT SYSTEM

BLM has developed a Visual Resource Management (VRM) system to classify visual resources based on scenic quality, visual sensitivity, and visual distance zones. **Table 3-15** lists management classes and various permissible levels of landscape alteration under the VRM system. Management classes are categorized into four levels (I through IV), with Class IV allowing the greatest modification of the landscape by disturbance or development. VRM classes and associated resources management objectives only apply to public land administered by BLM.

Public land located along the proposed rights-of-way routes is entirely within areas assigned to VRM Classes III and IV. Bedell Flat is one of few remaining undeveloped valleys north of Reno and is assigned to VRM Class IV. Multiple dirt roads and stock tanks are existing visible intrusions.

The KOPs were established for evaluating visual contrasts. Factors considered in selecting these views included angle of observation, number of viewers, duration of view, relative apparent size of the Projects, season of use, and lighting conditions. Three KOPs were selected and evaluated to represent locations on roads approaching the Projects Area from which a person may be expected to view Project features (**Figure 3-8**). Selected KOP views for the proposed Projects are shown on **Figures 3-9** and **3-10.**

TABLE 3-15
Visual Resource Management Objectives

Class	Objective
I	Objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes, it does not preclude limited management activity. The level of change to the characteristic landscape should be low and must not attract attention.
II	Objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color and texture found in the predominant features of the characteristic landscape.
III	Objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant features of the characteristic landscape.
IV	Objective of this class is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. The impacts of these activities should be minimized through careful location, minimal disturbance and repetition of the basic elements.

Source: BLM 1986.

KOP-1 is located at the intersection of the existing Tuscarora Natural Gas Pipeline and Fish Springs Ranch Road. This is a 1.5-mile southern view of the Fish Springs Ranch pump station, storage tanks, and Sierra Pacific Power Company's electrical substation.

KOP-2 is located on Matterhorn Boulevard at the high point between Antelope and Lemmon Valleys. This is a drive-by view of the proposed Fish Springs Ranch terminal storage tank located several hundred feet and slightly uphill to the east.

KOP-3 is located on the main road through Bedell Flat at the access point to Intermountain Water Supply well BF-1 and pump station. This is a flat cross-valley view of the pump station storage tanks.

SOCIAL AND ECONOMIC RESOURCES

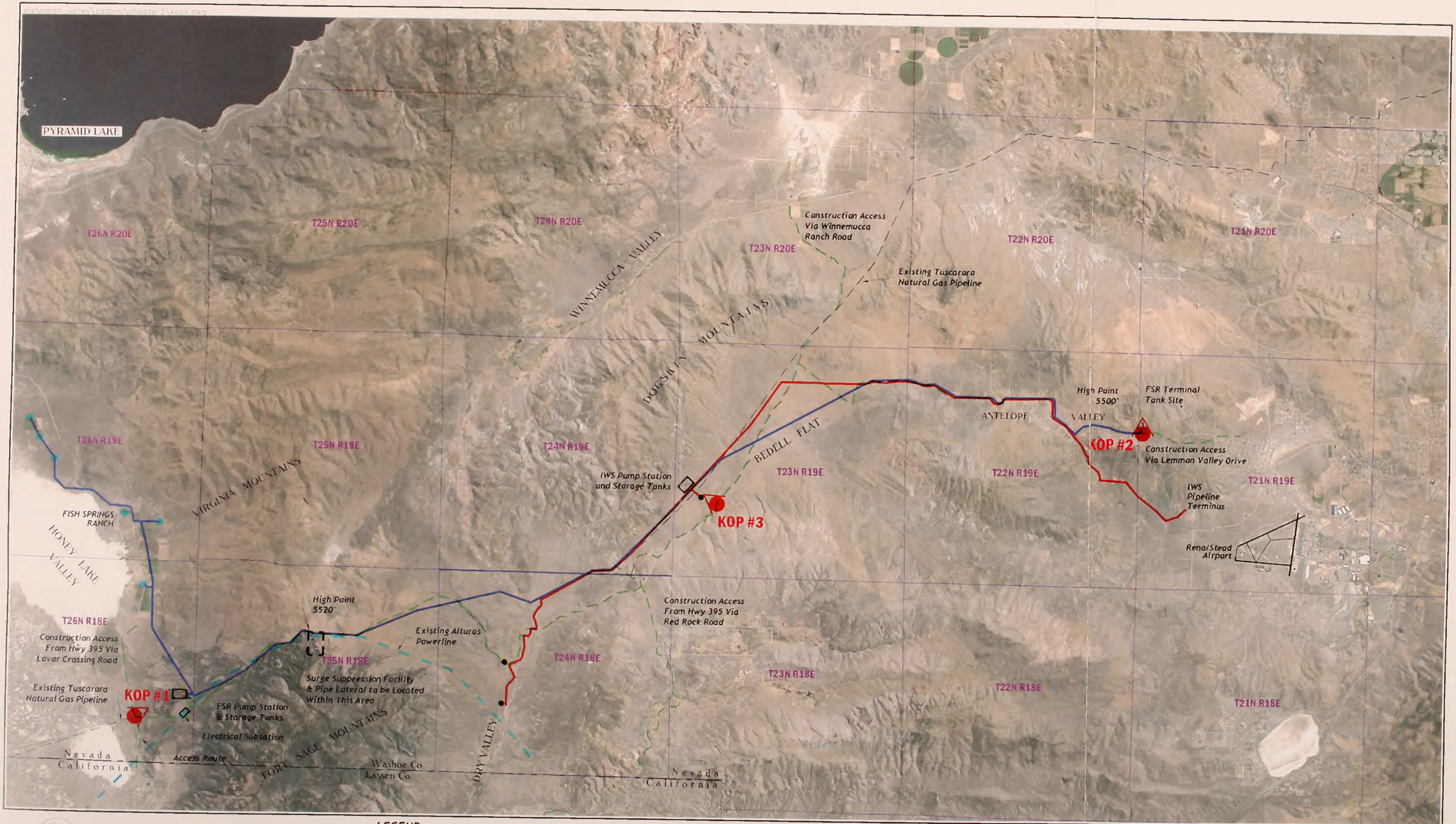
The Study Area for population, demographics and housing is Washoe County. The county covers 6,342 square miles in the northwest section of the state bordering California and Oregon. Reno, the county seat, is the largest city in northern Nevada, covering 56 square miles in the southern part of Washoe County. Reno was incorporated in 1903 and is governed under a council-manager form of government. The proposed Rights-of-Way Projects are located in the North Valleys Planning Area in the unincorporated county, which the Washoe County Department of Community Development defines as the Antelope Valley, Cold Springs Valley, Lemmon Valley, and Long Valley Hydrographic Basins. Population statistics for Washoe County, Reno, and the North Valleys Planning Area are shown in **Table 3-16.**

The state of Nevada grew over 66 percent between the 1990 and 2000 census, primarily due to the growth in the Clark County/Las Vegas area. In comparison, the U.S. population grew at 13 percent during the same time frame.

TABLE 3-16
Population Statistics for Washoe County, City of Reno, and North Valleys

Area	1990	2000	Annual Average Growth Rate 1990-2000	2003/2004 Estimates	Annual Average Growth Rate 2000-2003/2004
Washoe County	254,667[1]	339,486[1]	3.3%	383,453[4]	3.2%
City of Reno	133,850[1]	180,480[1]	3.5%	199,249[4]	2.6%
North Valleys Planning Area	13,300[2]	24,431[3]	8.4%	30,147[5]	7.8%

[1] U.S. Bureau of the Census 2001.
[2] Washoe County Department of Community Development 2003.
[3,5] Giesinger 2004, 2005.
[4] Whitney 2005.



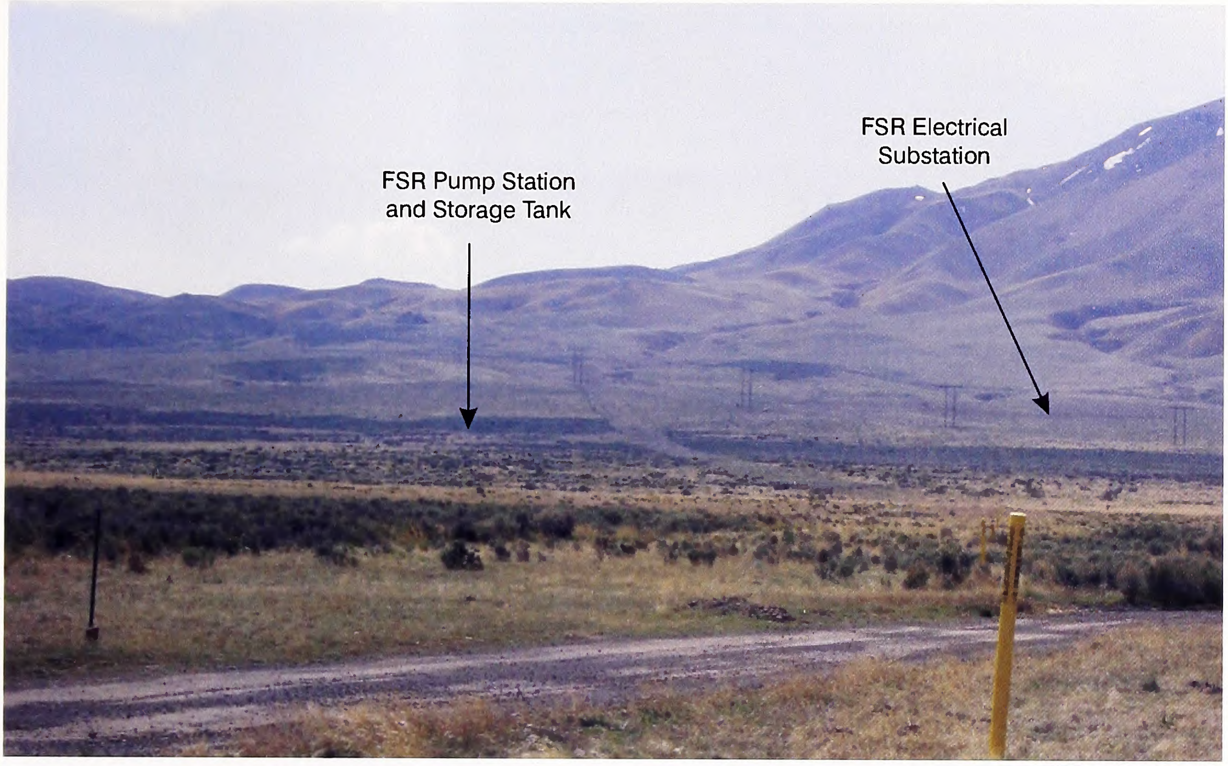
N

Not to Scale

LEGEND

IWS	INTERMOUNTAIN WATER SUPPLY
FSR	FISH SPRINGS RANCH
— —	PROPOSED ACCESS ROUTES
— - —	TUSCARORA NATURAL GAS PIPELINE
— —	ALTURAS POWERLINE
——	TOWNSHIP AND RANGE
——	PROPOSED IWS WATERLINE
——	PROPOSED FSR WATERLINE
●	PROPOSED IWS WELL
●	PROPOSED FSR WELL
KOP #3	KEY OBSERVATION POINTS (KOP) LOCATION (Direction Indicated)

Location of Key Observation Points
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 3-8



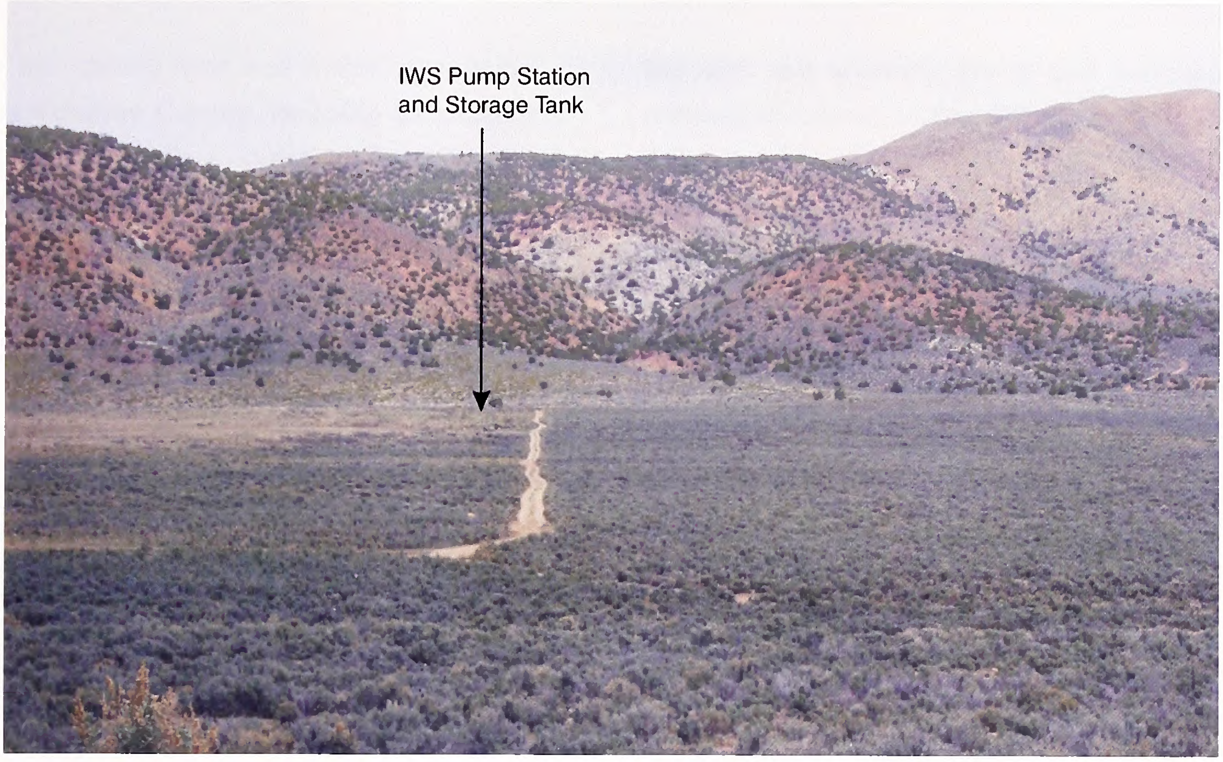
KOP-1 View from Fish Springs Ranch Road looking south.

KOP-2 View from highest point on Matterhorn Boulevard looking east.

See Figure 3-8 for Location of Key Observation Points (KOPs)

FSR = Fish Springs Ranch

KOPs 1 and 2
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 3-9



KOP-3 View from Bedell Flat Road looking east across valley.

See Figure 3-8 for Location of Key Observation Points (KOPs)

IWS = Intermountain Water Supply

KOP 3
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 3-10

Reno is the county seat and major population center of Washoe County. In 2000, 53 percent of Washoe County's population lived in the City of Reno with 27 percent residing in unincorporated areas of the County. Basic population and demographic information for Washoe County is shown in **Table 3-17**.

According to the Consensus Forecast presented in the Truckee Meadows Regional Plan, age distribution of the population is expected to change over the next 2 decades, thereby creating a net decrease in the percent of the population under 20 and a continued aging of "baby boomers", which will decrease the size the working group and increase the number of retired senior citizens (TMRP 2003).

Housing did not grow as quickly as the population achieving a growth rate of 28.2 percent between 1990 and 2000, reducing the vacancy rate from 19.4 percent in 1990 to just over 8 percent in 2000. An average of 2.6 persons per household was recorded. The Washoe County Department of Community Development estimated there were 8,005 houses in the North Valleys Planning Area in 2000 (Giesinger 2004), indicating a population per household of 3.05 persons. Population by household type in Washoe County during 2000 is presented in **Table 3-18**.

TABLE 3-17
Washoe County Population by Category

	1990	Percent of Total	2000	Percent of Total	Percent Change 1990-2000	Percent Change per year 1990-2000
Population	254,667		339,486		33%	3.3%
Male	129,088	51%	172,080	51%	33%	3.3%
Female	125,579	49%	167,406	49%	33%	3.3%
Under 20 years	65,983	26%	94,009	28%	42%	4.2%
65 years and over	26,140	10%	35,797	11%	37%	3.7%
Median age			35.6			

Source: Sonoran Institute 2003.

TABLE 3-18
Population by Household Type in 2000 for Washoe County

	County	Percent of Total	State	Percent of Total
Total housing units	143,908		827,457	
Occupied housing units	132,084	91.8	751,165	90.8
Vacant housing units	11,824	8.2	76,292	9.2
Seasonal, Recreation, or Occasional Use	3,624	2.5	16,526	2.0
Homeowner Vacancy Rate (%)	2.0		2.6	
Rental Vacancy Rate (%)	7.8		9.7	
Housing tenure	**County**	**Percent Occupancy**	**State**	**Percent Occupancy**
Occupied housing units	132,084		751,165	
Owner-occupied housing units	78,296	59.3	457,247	60.9
Renter-occupied housing units	53,788	40.7	293,918	39.1
Avg. household size – owner occupied	2.7		2.7	
Avg. household size – renter occupied	2.4		2.5	

Source: Sonoran Institute 2003.

The median value of Washoe County owner-occupied housing in 2000 was $161,600. Median values in Nevada were $142,000 and $119,600 in the United States (U.S. Bureau of the Census 2001). Washoe County had a home ownership rate of 59.3 percent in 2000, which was less than for the state as a whole (60.9%), indicating that housing may not be as affordable as in other areas of the state.

PUBLIC SERVICES AND FACILITIES

The North Valleys Area Plan, prepared by the Washoe County Department of Community Development in March 2004, provides the following summary of public services and facilities in the North Valleys Planning Area:

WATER SERVICE

Water service in the Planning Area is provided by a combination of local groundwater and surface water supplies from the Truckee River. The two major water providers in the North Valleys Planning Area are Washoe County Department of Water Resources and Truckee Meadows Water Authority (TMWA). Other purveyors of water include: Reno Park Water Company (Utilities, Inc.), Silver Valley Trailer Park, Black Springs General Improvement District (GID), Foothill Trailer Park, Reno Sahara Mobile Homes, and Webb's RV Park. Development in the Planning Area is dependent upon a reliable water supply that will serve the needs of the residents and businesses in the area (Washoe County Department of Community Development 2004).

SANITARY SEWER SERVICE

Sanitary sewer in the Planning Area consists of individual septic systems and community sewer services provided by Washoe County and the City of Reno. Residential development in the area must meet County standards requiring a sanitary sewage system capable of handling a minimum of 325 gallons per day per dwelling unit (Washoe County Department of Community Development 2004).

FIRE PROTECTION

The Reno Fire Department provides fire protection services for the North Valleys Planning Area. BLM is responsible for wildland fire protection on public land under its jurisdiction. Emergency and non-emergency ambulance service for the area is provided by the Regional Emergency Medical Services Authority, which also provides air transport within a 150-mile radius of Reno (BLM 2003).

POLICE PROTECTION

Police protection in the North Valleys Planning Area is provided by the Washoe County Sheriff's Office. Currently there are two patrol units regularly assigned to the area, with an average response time of 10 minutes (Washoe County Department of Community Development 2004). Reno Sparks Indian Colony peace officers patrol the Indian Colony.

SCHOOLS

The Planning Area is currently served by Nancy Gomes, Lemmon Valley, Silver Lake, Desert Springs, and Alice Smith Elementary schools;

William O'Brien Middle School; and North Valleys High School (Washoe County Department of Community Development 2004).

PARKS AND RECREATION FACILITIES

The Planning Area is served by five community/neighborhood parks, which total 45 developed acres: Cold Springs, Golden Valley, Lemmon Valley, Martin Luther King, and Silver Knolls Park. Washoe County completed 7 acres of the 160-acre North Valleys Regional Sports Complex in 1996. Opportunities exist in the area for dispersed recreation on public land administered by BLM and the U.S. Forest Service (Washoe County Department of Community Development 2004).

ECONOMIC ACTIVITY

Washoe County is the Study Area for economic activities. The county which supported 240,785 full- and part-time jobs in 2000, an increase of 172,382 jobs since 1970, and an annual average increase of 8.4 percent (**Table 3-19**). The Sonoran Institute (2003) notes that over the last 30 years, job growth in Washoe County has been slower than the state but faster than the nation.

The job mix in Washoe County remained relatively unchanged since 1970. Growth in the services and professional sector was responsible for growth in the number of jobs in the region lead by increases in services (health, legal, business, others); retail trade; finance, insurance, and real estate. Jobs in the manufacturing sector experienced moderate growth as did jobs in construction and agricultural services.

In 2000, over 90 percent of Washoe County jobs were in the private sector while 9.4 percent were in government, a decline of 5 percent in the last 30 years. Retail trade, services, and finance/insurance/real estate were the three leading private employers accounting for 64 percent of total jobs in the county and reflecting the importance of the gaming/resort industry on the local economy.

Unemployment rates in Washoe County are typically lower than in Nevada and the rest of the U.S. In 2001, the unemployment rate in Washoe County was 4.1 percent, compared to 5.3 percent for the state and 4.8 percent for the nation (U.S. Department of Labor 2004).

Median household income and per capita income are commonly used to understand the relationship within and outside an area with regard to personal income. Washoe County out performed the state of Nevada and the United States with regards to growth in median household income and per capita income between 1989 and 1999 (**Table 3-20**). In 1999, per capita income level in Washoe County was approximately 6 percent higher than the per capita income level in Nevada and the U.S., and median household income was nearly 3 percent higher than in the state (U.S. Bureau of the Census 2001).

TABLE 3-19
Employment by Industry Changes from 1970 to 2000 for Washoe County

	1970	Percent of Total	2000	Percent of Total	New Employment	Percent of New Employment
Total Employment	68,403	-	240,785	-	172,382	-
Farm and Agricultural Services[1]	492	0.7	2,855	1.2	2,363	1.4
Farm	302	0.4	689	0.3	387	0.2
Ag. Services	190	0.%	2,166	0.9	1,976	1.1
Mining	343	0.5	953	0.4	610	0.4
Manufacturing[2]	3,060	4.5	14,870	6.2	11,810	6.9
Services and Professional	50,097	73.2	181,883	75.5	131,786	76.4
Transportation and Public Utilities	4,697	6.9	13,664	5.7	8,967	5.2
Wholesale Trade	3,315	4.8	13,620	5.7	10,305	6.0
Retail Trade	10,977	16.0	36,928	15.3	25,951	15.1
Finance, Insurance, & Real Estate	5,871	8.6	24,212	10.1	18,341	10.6
Services (Health, Legal, Business, Others	25,237	36.9	93,459	38.8	68,222	39.6
Construction	4,210	6.2	17,607	7.3	13,397	7.8
Government	10,201	14.9	22,617	9.4	12,416	7.2

Source: Sonoran Institute 2003.

[1] Agricultural services include soil preparation services, crop services, forestry services (e.g., reforestation services), fishing, hunting, and trapping.

[2] Manufacturing includes paper, lumber and wood products manufacturing.

TABLE 3-20
Per Capita and Median Household Income for 1999

	Per Capita Income	Median Household Income
Washoe County	$23,277	$45,815
State of Nevada	$21,989	$44,581
United States	$21,587	$41,994

Source: U.S. Bureau of the Census 2001.

GOVERNMENT AND PUBLIC FINANCE:

Washoe County, established in 1861, is a political subdivision of the state of Nevada with a manager-commission form of government. Washoe County's 2002-2003 budget was $478,972,055, of which $257,348,551 went to the general fund. About 60 percent of the general fund expenditures are for personnel. The 2002-2003 Washoe County budget experienced a $14 million shortfall forcing reductions and a 6 cent property tax increase. Washoe County receives $1.3453 per $100 of assessed value. Nevada ranks 43 out of the 50 states for tax burden per capita for state and local government (Washoe County Fast Facts 2004). Tax revenues increased during FY 2003-2004 budget cycle, indicating an economic upturn in Washoe County.

CULTURAL RESOURCES

Cultural resources are locations of past human activity, occupation, or use. Prehistoric resources reflect activities that occurred prior to introduction of written records. Since written documentation is absent, archaeological sites are the only source of data concerning prehistoric societies. Historic resources reflect Euro-American and Asian-American occupation. The scientific value of these resources relates to their potential to inform on how human societies operate and change. In addition to their scientific value, cultural resources may have aesthetic and cultural value. Aesthetic values may be expressed in rock art sites, or in standing structures of architectural significance. Historic sites may have cultural value if they link a living community to a place that conveys a sense of cultural identity. The Study Area for cultural resources is defined by the corridors associated with the proposed Projects Area and land adjacent to the Projects Area.

PREHISTORIC OVERVIEW

The Early Holocene period in the Great Basin (ca. 12,000 to 7,000 BP) is characterized by Great Basin fluted points, Great Basin Stemmed points as well as crescents, formal scrapers, burins and gravers (Delacorte 1997; Young *et al.* 2000). Sites from the Early Holocene in the Great Basin tend to be low in density, have tool kits generally associated with lake/marsh systems suggesting small populations, high residential mobility, and a focus on lakeshore resources (Young *et al.* 2000).

Onset of the Post-Mazama period (ca. 7,000 to 5,000 BP) is marked by an ash layer created by eruption of Mount Mazama about 7000 years before present, and also by the appearance of Northern Side-notched points. This point type is rare in the general Project Area (Young *et al.* 2000). It appears that some corner-notch, contracting stem and lanceolate projectile points might have first appeared during the Post-Mazama period (Delacorte 1997; Young *et al.* 2000). Post-Mazama sites tend to show a transition away from lakeshore/marsh environments and the more intensive utilization of well-watered refugia. This is due to a mid-Holocene warming episode in the Great Basin (Young *et al.* 2000).

The Early Archaic Period (ca. 5,000 to 3,500 BP) is represented technologically by the appearance of milling stones and Gatecliff points (Young *et al.* 2000). Site density increases over

the Post-Mazama period and there is an increased occupation of uplands. Early Archaic sites tend to be small and are characterized by generalized tool kits with signs of short site occupations. This suggests that population densities during the Early Archaic were low and that groups were highly mobile, exploiting a variety of dispersed plant and animal resources.

The Middle Archaic Period (ca. 3,500 to 1,300 BP) is a period of increasing economic and social complexity evidenced by a rise in artifact and site type diversity. In the western Great Basin and on the eastern front of the Sierras this period is associated with early and late Martis and Elko style points (McGuire 1997). During this period the variety and quantity of perishable artifacts increases substantially (Young *et al.* 2000). There is also an increase in the presence of curated ground stone tools. Site size increases and there is a shift to a more residential pattern with the appearance of large base camps and associated task-specific locations that show evidence of repeated use. The increase in long-term occupation sites corresponds to evidence of a greater reliance on communal hunting and gathering of resources that required complex social organization or large amounts of labor to exploit (Young *et al.* 2000).

Economic, technological, and social trends that started during the Middle Archaic intensified during the Late Archaic Period (ca 1,300 to 600 BP). Technologically the Late Archaic is characterized by Rose Spring and Eastgate points, the introduction of the bow and arrow, and the shift toward smaller bifaces and expediently manufactured flake tools. There is also a shift towards the use of locally available tool stone, in some cases from sources of poor quality (Young *et al.* 2000). Ground stone tools were of a more expedient nature and there was a decline in the use of perishable technologies. The tendency toward less formal and non-curated technologies is associated with a diminished foraging range and an increase in local resource exploitation. The use of pine nuts and an increased emphasis on hunting small game led to the occupation of previously unused areas in the uplands and on valley floors (Young *et al.* 2000).

Technologically the beginning of the Terminal Prehistoric Period (ca. 600 BP to contact) is marked by the appearance of the Desert Side-notch and Cottonwood projectile points, generally associated with the arrival of Numic speaking groups to the northwestern Great Basin. Aside from new projectile point types there is little technological change from the Late Archaic. Sites from this period do show a shift toward new areas of resource exploitation. There also appears to be a change in social organization from the band-sized groups of the Middle and Late Archaic to family based units (Young *et al.* 2000).

HISTORICAL OVERVIEW

Several themes prominent to regional history are not likely to be reflected within the immediate study corridor. Those themes include fur trapping, early exploration, emigration associated with the California and Nevada gold rushes, railroads, and water reclamation activities typical of the early 1900s. Even mining, which played such a large role elsewhere in the region, is not likely to be well represented in the Projects Area. Rather, historic period cultural resources found in the

project area relate mostly to the ranching, dry land farming, and transportation themes.

MINING

Little mining related activity appears to have occurred along the proposed Projects corridor. The nearest mining areas are the Peavine, Stateline Peak, and Pyramid districts. The Peavine District, located immediately northwest of Reno, was established after extensive gold, silver, and copper deposits were discovered on the east side of Peavine Peak in 1863. Within a year, the town had over 200 inhabitants. Activities peaked during the early 1870s due in part to the mine's proximity to the CPPR railroad. By 1880 the population had declined to a few dozen people. Production data from the Peavine District suggest it was the most active during the early 1870s, the 1900s, and from 1936 through 1944 (Bonham 1969). The Pyramid District is located in the Mullen Pass area, just southwest of Pyramid Lake. Claims were located in the area as early as 1863, but work did not begin in earnest until the mid 1870s. Available records (Bonham 1969) suggest that the main period of production in the district was during the 1870s and 1880s. Since that time, small-scale mining activities have resulted in the occasional shipment of selected ore. Uranium was discovered in the district in 1954 and intermittent small-scale production has continued up to the present.

The Stateline Peak District encompasses Petersen Mountain, located along the boundary between Nevada and California. Two claims in the district were patented in 1887 and some copper ore was removed. The Antelope Mine was opened in the late 1930s and saw some limited production through 1941. The mine was apparently reopened in 1945, but production data are unavailable. Uranium was discovered on the Buckhorn claims in 1954 and small-scale production was reported in 1955 and 1956 (Bonham 1969).

RANCHING

A combination of factors led to development of ranching in the Study Area. Prior to the advent of the railroad, California had been the regional center of cattle production. Western Nevada relied on California as a source of beef cattle during these early years. Due to droughts during the late 1860s California ranchers began using rangelands in northern Nevada as summer range. The advent of the railroad in 1868 allowed the beef industry to become regional in scope (Townley 1983). Cattle could be taken off of the range in northern Washoe County, fattened in the Truckee Meadows, and shipped to the bay area for slaughter. Even comparatively remote areas such as the proposed Project corridor were integrated into this regional marketplace.

Locally, ranching began in the Honey Lake and Winnemucca Lake areas during the 1850s through the 1870s. During this period, many ranchers drove their herds to the central valley of California during the winter, using their Nevada ranch lands only as summer pasture. Ranchers acquired land through the National Homestead Act of 1862, the Swamp and Overflow Act, or by filing preemption claims. By these means, early ranchers gained access to most if not all water sources and potential pasture areas in the region. By controlling the water, the rancher controlled the range. This allowed ranchers to enlarge their herds of cattle, sheep, and horses and to grow and cut

more hay. Year-round operations became more commonplace.

The period between 1880 and 1900 was one of economic depression over much of Nevada. Mining on the Comstock had collapsed and there was little to replace it. The state's population declined by approximately 35 percent and those that did remain became more urbanized. Transportation became a primary economic theme of the period, drawing people to towns and cities along railroads corridors. Many pinned their economic hopes for the state on agriculture (Townley 1983). Large ranching operations came into being that operated over huge acreages within Nevada and adjoining states. This was the time of the cattle baron.

The Pyramid Land and Stock Company, owned by Patrick Flanigan, was the local manifestation of this pattern. Flanigan moved to Nevada in 1877 and began herding sheep in the early 1880s, grazing on public domain land around Pyramid Lake. He began acquiring property in the 1890s, including ranches near Gerlach, Constantia (in California), in Winnemucca Valley, and a number in the general Projects Area. At the height of his career, Flanigan ran more than 30,000 ewes, 2,000 cattle, and 1,800 horses in Washoe County (Moody 1985; Wentworth 1948). Beginning in 1914, Flanigan's empire began to unravel. Declining sheep prices and failed irrigation ventures eventually forced him into bankruptcy.

The sheep market boomed during the 1910s and 1920s, prompting many ranchers to increase the number of sheep they kept versus cattle. After the Wool Crash of 1923, the sheep industry dwindled. This trend was reinforced by several drought years, the cumulative effect on vegetation of over grazing, and passage of the Taylor Grazing Act. This act was intended to manage public grazing, and to prevent degradation of the public domain due to overgrazing. By World War II, ranching was no longer a prominent industry in the general Projects Area.

DRY LAND FARMING

Beginning in the late 1800s, there was an interest in reclaiming lands with 20 inches or less of annual rainfall. This, coupled with the still prevalent Jeffersonian ideology of land ownership and independence, led to a new wave of agriculturalists – dry land farmers. The dry land farming movement reached full flower during the first two decades of the Twentieth Century. Not surprisingly, the dry land farming movement coincided with a renewed interest in claiming federal land. Ranching interests had claimed prime agricultural land containing running water during the 1870s and 1880s. By the early part of the twentieth century, only marginal land remained available for homesteading. In the absence of a secure source of water, many homesteaders found that they could not make a living on parcels as small as 160 acres. The Enlarged Homestead Act of 1909 increased the amount of land that could be filed on to 320 acres. Subsequent revisions to the act further enlarged the size of the parcel that could be claimed, and relaxed residence and improvement requirements.

Many dry land farmers homesteaded in Honey Lake Valley during the 1900s and 1910s, when the dry farming movement was at its height. These homesteads operated at two levels: a subsistence level and at a capital generating

level. Gardens provided fresh produce that could be canned for later use. Keeping a limited number of chickens, hogs, and maybe even cattle provided eggs and milk, as well as meat. These activities were intended to ensure that the family would not starve. In theory, the homestead was also supposed to produce a crop of sufficient size that it could be sold. Money derived from the crop was used to purchase items that could not be grown on the homestead. When the crop failed, the homesteader was forced to barter for those goods, borrow money to pay for them, or simply do without. Their limited profit margin put homesteaders in an awkward position when it came to shifts in the economic market place. Their limited reserves made them particularly susceptible to local or national agricultural depressions. This was a major factor following World War I when an agricultural depression set in that lasted throughout the 1920s. Dry land homesteaders were also subject to changes in local climatic conditions. Droughts, changing water tables, depletion of nutrients in the soil, or the accumulation of salts could have devastating impacts on a small-scale operation. For example, local droughts occurred in the Honey Lake area during the mid 1910s. By 1919, the lake was dry. It did not fill again for over 20 years.

Most dry land homesteads did not prove to be economically viable. Some provided for a subsistence level of existence for the residing family, but most failed even at that basic level. Many homesteaders took jobs to secure sufficient capital to keep their families on the homestead long enough to prove up. Many moved off their claims before proving up. Homesteaders had largely left the area by the 1920s. Few holdouts survived the depression.

ROADWAYS

The widely dispersed nature of settlement in the American West carried with it the need for dependable transportation systems. As local communities began to grow, and as the agricultural and commercial basis of the region developed, efforts were made to establish roads for internal circulation and with improved access to external markets. During the mid-19th century, private parties were responsible form most road building. Not until the later part of the 19th century did counties develop the administrative apparatus and expertise to build a comprehensive road network. Four north-to-south roads extended through or adjacent to the Projects Area.

The Truckee Meadows to Honey Lake Road extended along what is today U.S. 395. Already established by 1865, the "Road to Peavine and Honey Lake" extended north from Reno, through Golden and Lemmon Valleys, and then northward. This road corridor, located west of the Projects Area, has been largely covered over by later transportation systems, be they highways or railroads. Only brief segments remain in isolated locations.

East of the Projects Area, a local roadway was established that connected the Truckee Meadows and Surprise Valley in northeastern California. The Surprise Valley Road ran from the Truckee River north through Spanish Springs Valley, then through Warm Springs and Winnemucca valleys, over to Honey Lake, then north to Surprise Valley. In its early years, the road served as a cut-off to the newly discovered gold mines of southern Idaho. Once the Idaho gold rush had subsided, the road to Surprise Valley was far less traveled. The

portion of this road that extends from Winnemucca Valley to Fish Springs extends along the Proposed Projects rights-of-way.

Between these two primary travel corridors, two lesser roads were noted. The first was known as the Anderson Road. Anderson registered his toll road in March of 1872 (Angus No Date) along what appears to be an earlier wagon road. The Anderson Road extended north-northeast from Reno through Sun Valley and Spanish Springs Valley. It intersected the Surprise Valley Road at Junction House. By 1880, Anderson had sold the road to Washoe County, and it remained in use until at least 1908. The road was alternately known as the Winnemucca Valley Road or the Pyramid Lake Indian Reservation Road. Portions of this road separate from the Surprise Valley Road are located outside the Proposed Projects rights-of-way.

The fourth road extended north from Reno through Lemmon Valley (Stead area) and into Red Rock Valley. In Red Rock Valley, the road branched, one turning west and joining with the Truckee Meadows to Honey Lake Road. The other branch turned to the east and extended to a point called "Todhunter" at the very northwest edge of Bedell Flat (shown as a "ranch" on 1:250,000 scale topographic map). At this ranch, the road again branched. The fork to the southeast extended along the northeast edge of Bedell Flat before passing into Warm Springs Valley. The branch to the north intersected an east-west road that extends along Dry Valley Creek. The road along Dry Valley Creek served as an east to west link between the Surprise Valley Road and the Truckee Meadows to Honey Lake Road. Portions of the unnamed road extend through the Proposed Projects rights-of-way.

CULTURAL RESOURCE PROJECTS IN AREA OF POTENTIAL EFFECT

In total, 40 cultural resource projects have occurred completely or in part within the archival Study Area. These studies include archaeological surveys, testing, and data recovery associated with utilities development, agricultural/irrigation improvements, fire rehabilitation, and recreational use of public land.

A total of 117 cultural resources have been identified within the North Valleys Rights-of-Way Projects corridor. Of these, 43 are isolated artifacts and 74 are sites. Of the isolated finds, 31 contained items that are prehistoric in age, while the remaining 12 contained historic period items. These isolates meet criteria listed in the *State Protocol Agreement between the Bureau of Land Management and the Nevada State Historic Preservation Office* for isolated artifacts and features. As noted in the State Protocol, isolated artifacts and features are categorically ineligible for listing on the National Register.

Of the 74 sites, 59 contain prehistoric period material, nine contain historic period material, and six contain material representing both the prehistoric and historic period, for a total of 80 site components. Ten of the site components are National Register eligible, 55 site components have been determined not to be National Register eligible, and 15 site components remain unevaluated.

NATIVE AMERICAN RELIGIOUS CONCERNS/INDIAN TRUST RESPONSIBILITIES

Ethnographic resources include sites or areas of concern to Native American groups either for heritage or religious reasons. A site may have a heritage value if it serves as a link between a living community and a place that conveys a sense of cultural identity, or if a particular social or religious concern has been expressed regarding the site.

The Proposed Projects lie within the ethnographic territory of three tribal groups – Northern Paiute, Mountain Maidu, and Washoe. This area constitutes the Study Area for Native American Concerns.

Two Northern Paiute bands inhabited the area, the *Tasiget Tuviwarai* and the *Kuyuidokado* Paiute bands. The *Tasiget Tuviwarai* mainly inhabited Winnemucca and Spanish Springs valleys and the Lower Truckee Meadows. The *Kuyuidokado* Paiute band occupied an area east of the *Tasiget Tuviwarai*, which included all of Pyramid Lake and lower reaches of the Truckee River. The Washoe occupied the Sierra Nevada region that included Lake Tahoe and the valleys along the eastern slope of the Sierra Nevada Mountains.

NORTHERN PAIUTE

Ethnographic sources regarding the Northern Paiute include Kelly (1932), Stewart (1939, 1941), Riddell (1960), Heizer (1970), Inter-tribal Council (1976), Pendleton *et al.* (1982), and Fowler and Liljeblad (1986). Young and McGuire (2003), Young *et al.* (2000), and Delacorte (1997) provide recent summaries pertinent to the immediate Projects Area.

At the time of European contact, the Great Basin was occupied by six Numic speaking groups, one of which was the Northern Paiute. The Northern Paiute differed slightly from band to band due to variations in local environments, but generally were organized in the same fashion and followed a similar annual round (Delacorte 1997).

The Northern Paiute were hunter-gatherers. Their subsistence was based on seasonal rounds that focused on geographical and seasonal variations in food sources. Plant resources provided the bulk of the diet from late spring to early fall. During this time seeds and roots were gathered and stored for the winter. During the spring fishing became a major importance when cutthroat trout (*Salmo clarki henshawii*), suckers (*Catostomus* sp.) and cui-ui (*Chasmistes cujus*) migrated up local rivers to spawn. However, an emphasis remained on gathering various greens, shoots, and early ripening seeds found in and around springs and drainages. In late fall, trips were made to the Diamond Mountains and Virginia Range to collect pine nuts.

Although not as prominent an activity as gathering, hunting was still practiced. Deer, antelope, and desert bighorn sheep were the primary game of choice, and were hunted by individuals and groups. Groups would drive large numbers of antelope into corrals. This communal technique also was used in the hunting of rabbits and hares in the fall when the animals were in peak condition. Marshes were

exploited for various resources including ducks and waterfowl, which were taken using decoys, nets, and traps.

Northern Paiute social and political organization was centered on the independent family. Senior family members made decisions regarding household affairs and dealings with other family groups. Outside these family units, local camps had headmen (*poinabi*) that acted as camp advisors and served as the focal point for discussions of mutual concerns. The headmen were selected by consensus of the group; this person was not an inherited position. Task group leaders were responsible for antelope, rabbit, and deer drives, as well as major fishing expeditions. These task-oriented positions fluctuated and were determined by an individual's skill and luck. While in charge, task leaders ran the daily activities connected with that particular task (Fowler and Liljeblad 1986).

Social organization of the Northern Paiute was centered on a network of kinsmen and friends that included family, close relatives, the camp to which the family belonged, associated camp groups, and individuals that resided outside the camp. The family remained the most important unit for social integration. Family units included parents and siblings and as time went on, spouses and children were included. The camp group was an important social organization to which a family belonged. The camp group often changed size and composition due to seasonality and resource availability. Camps would often pool resources and work as cooperative units for tasks such as game drives (Fowler and Liljeblad 1986).

MOUNTAIN MAIDU

Ethnographic sources for the Mountain Maidu include Powers (1976), Dixon (1905), Kroeber (1925), Voeglin (1942), and Riddell (1960, 1968, 1978).

The Mountain Maidu occupied an area that extended from Eagle Lake on the north to Sierra Buttes on the south, and from Lassen Peak on the west to Honey Lake on the east. The Maidu inhabited a series of mountain valleys and where weather allowed, permanent villages were established. Elsewhere, seasonal villages or camps were only occupied during warmer months of the year. The Maidu penetration into the Great Basin was greater in earlier times than at the time of first European contact. By their own admission, the Maidu at some earlier time held all of Honey Lake Valley and its environs. About 1700, the Maidu withdrew to the west side of Honey Lake, vacating areas east of the lake that were subsequently taken over by the Northern Paiute.

A village community served as the only political organization apparent within the Maidu. Recognized as an autonomous political unit, a vial community consisted of several adjacent villages. Each village was self-sufficient. Individual villages consisted of fewer than ten houses and were occupied by about 35 people. Each community village owned and defended a territory held in common by all members of the village community. A village community seldom included more than 200 individuals. The village with the largest semi-subterranean earth lodge was considered the central village. This was the residence of the headman or chief of the village

community. Dixon (1905) reports that the chief was selected with the aid of a shaman, whereas Vogelin (1942) indicates the position was inherited patrilineally. The chief was a man of wealth, ability, and generosity and his role was generally that of an advisor. A council assisted the chief, providing essential ritual and political leadership to the village.

The Maidu regularly constructed three types of structures. The first was a semi-subterranean, earth-covered structure occupied during the winter by one or more families. The floor of the lodge was excavated three to five feet below ground and ranged in size from 20 to 40 feet in diameter. The excavation was covered with poles, matting, and earth removed during excavation. Major villages had a larger version of this type lodge that was used as a ceremonial or assembly house. The third type of structure, a simple shade shelter constructed of upright poles supporting a flat roof of branches, was used during the summer months. These shelters were constructed close to hunting and gathering sites located some distance away from winter camps.

The Maidu made extensive use of plants and animals, serving subsistence, religious, and material necessities. In the Susanville area, Maidu subsistence activities focused on fish and waterfowl resources present in local streams and marshes, as well as plentiful game such as deer. Men also hunted bear, both for meat and for the hide, which was used in rituals. Women and children gathered nuts and seeds. Acorns were the primary source of nut meat. Once leached the acorn flour was used to make soup, mush, or bread. Other nuts that were collected included sugar pine, yellow pine, hazelnuts, and buckeye trees. Women also gathered and processed vegetal foods such as greens, tubers, seeds, berries, nuts, and acorns. Women made all of their own tools, which included an array of baskets used for the collection, processing, and storage of food. Mint tea and manzanita cider were common drinks.

During the spring, summer, and fall months, village members moved about their prescribed territories engaging in subsistence activities. With the onset of winter, however, activities diminished and became focused around the winter village. Although the Maidu territory was laced with a network of trails, it was unusual for a person living in a village to travel more than 20 miles from home in their lifetime. Trade items were widely distributed from village to village and from group to group. During winter months, villages made do using preserved and stored foods. Some families relocated to lower elevations, especially during severe winters. In most cases, however, groups of Maidu remained in their permanent village sites throughout the winter months.

WASHOE

Ethnographic data on the Washoe are contained in d'Azevedo (1956, 1963, and 1986), Barrett (1917), Downs (1966), Fowler *et al.* (1981), S. and R. Freed (1963), Lowie (1939), Nevers (1976), Price (1962, 1980), and Siskin (1941).

At the time of European contact, the Washoe was the only group living in the Great Basin whose language was not Numic. This has led many to believe that the Washoe have lived in the Great Basin longer than their Numic speaking neighbors. The Washoe are geographically located in an area that is partially

in the Great Basin and partially in California. As a result, the Washoe show characteristics of both regions. The area occupied by the Washoe contained a variety of life zones, from the boreal habitats of the Sierra slopes and Lake Tahoe to the Upper Sonoran xeric valley bottoms north and south of the Sierra slopes. This territory contained many plant and animal species not found in more arid portions of the Great Basin. Therefore, with periodic forays into adjoining areas for pine nuts, acorns, and fish, the Washoe were able to ensure a stable food supply.

Major habitation places were on valley floors where year-round settlements were established. The settlements were usually located on high ground close to a reliable source of water and fuel. Houses were constructed of poles covered by bark and set around a shallow pit to form a conical framework (Price 1962). These permanent encampments were seldom abandoned. While some members would leave for short journeys into the Sacramento Valley and Honey, Pyramid, Walker, and Mono lakes to exploit seasonal resources, the elderly and children would often remain behind at the camp (d'Azevedo 1986). Due to the abundance of lakes and streams, the Washoe relied heavily upon fish for year round sustenance. Lahontan suckers, mountain whitefish, trout, and cui-ui were exploited from various regions across the Washoe territory. Using different methods including spears, nets, weirs, traps, and hook and line, fish were harvested from lakes and rivers. The fish were then cooked on coals or pit roasted, any excess would be dried and stored for future use (d'Azevedo 1986).

Another vital part of subsistence was the reliance on plant foods. In early spring, bulbs and roots such as camas, bitterroot, sego lily, and wild onion were collected from valley floors. After this harvest, attention was focused on seed-bearing grasses and weedy annuals in the mid-summer (d'Azevedo 1986). Autumn brought acorns and pine nuts to the higher elevations that were harvested by family groups.

The Washoe did use hunting as a supplementary source of food. Individual hunters often pursued deer, antelope, and mountain sheep. And, in the case of antelope, communal drives were organized. These animals could be hunted year-round, although late summer was the ideal time to hunt deer (d'Azevedo 1986). Small game such as rabbits and hares were hunted as well as upland birds and waterfowl. The principal tool in hunting was the bow and arrow, and, in the case of communal antelope hunts, v-shaped corrals were made to trap animals.

The basic unit of social organization was a cluster of closely related households that shared the same or nearby winter camps and identified with its own leader. The nuclear family was seen as part of an extended family of close relatives living in a single dwelling or cluster of houses comprising the local community. Community size fluctuated over the course of a year, as various activities required families to come and go with the seasons.

Leadership roles among the Washoe were usually assigned to a respected and older person whom others came to for advice. Headmen (and occasional headwomen) were

chosen by the group, and the position was not inheritable or permanent. The headman was responsible for maintaining communication amongst groups. Sometimes this leader was the informal representative of a regional community (d'Azevedo 1986). Other leadership roles included war leaders who were selected from the best warriors. This position lasted only as long as the specific danger lasted. Another leadership role was the man selected to lead rabbit and antelope drives, which were also determined by skill and perceived natural powers as opposed to inheritance.

INDIAN TRUST RESPONSIBILITIES

It is the policy of the BLM Carson City Field Office to recognize and fulfill its obligations to identify, protect, and conserve trust resources of federally recognized Indian tribes and tribal members, and to consult with tribes on a government-to-government basis whenever plans or actions may potentially affect tribal trust resources, trust assets, or tribal health and safety. Any effect must be explicitly addressed in the planning/decision documents, including, but not limited to, Environmental Assessments, Environmental Impact Statements, and/or Management Plans prepared for a project or activity. The documentation shall:

(1) Clearly state the rationale for the recommended decision; and

(2) Explain how the decision will be consistent with BLM's trust responsibility.

In the event an evaluation reveals impacts to Indian trust resources, trust assets, or tribal health and safety, BLM would consult with the affected recognized tribal government(s), the appropriate office(s) of the Bureau of Indian Affairs, the Office of the Solicitor, and the Office of American Indian Trust. BLM shall be open and candid with tribal government(s) during consultations so that the affected tribe(s) may fully evaluate the potential impact of the proposal on trust resources and the affected bureau(s) or office(s), as trustee, may fully incorporate tribal views in its decision-making processes. These consultations, whether initiated by the tribe or BLM, shall be respectful of tribal sovereignty. Information received shall be deemed confidential, unless otherwise provided by applicable law, regulations, or Administration policy, if disclosure would negatively impact upon a trust resource or compromise the trustee's legal position in anticipation of or during administrative proceedings or litigation on behalf of tribal government(s).

CONSULTATION ACTIVITIES

Native American consultation regarding the proposed Projects is ongoing. Consultation will be conducted in accordance with the above stated policy and provisions of the National Historic Preservation Act, the American Indian Religious Freedom Act, and the Native American Graves Protection and Repatriation Act. The BLM Carson City Field Office has contacted representatives of the Pyramid Lake Paiute Tribe, Reno-Sparks Indian Colony, Susanville Ranchera, and Washoe Tribe. Information regarding effects the Proposed Projects would have on locations of religious, traditional, or cultural importance was requested by BLM. The BLM will make a reasonable effort to contact individuals with

close ties to the Projects Area, especially those that might be familiar with traditional cultural practices that may have occurred there.

ENVIRONMENTAL JUSTICE

Executive Order 12898 directs federal agencies to identify and address any disproportionately high and adverse human health or environmental effects of their programs on minority and low-income populations. Minority populations included in the census are identified as Blacks or African Americans; American Indians or Alaska Natives; Asians: Native Hawaiian or other Pacific Islanders; Hispanic; Latino; or other. The low-income level is defined as persons living below the poverty level. In 2000, the poverty-weighted average threshold for a family of four was $17,603, and $8,794 for an unrelated individual. Environmental Protection Agency (EPA), Council on Environmental Quality (CEQ), and BLM IM 2002-164 guidelines for the conduct of environmental justice assessments were followed when preparing this analysis. The Region of Influence or Study Area for environmental justice is Washoe County, including the Reno-Sparks Indian Colony.

IDENTIFICATION OF MINORITY AND LOW INCOME POPULATIONS

Within the Study Area, the Reno Sparks Indian Colony was identified as a potential area for minority or low-income population. The Reno Sparks Indian Colony is composed of approximately 94 percent American Indians, indicating that a minority population does exist in the Study Area (BLM 2003). Population by race for Washoe County in 2000 is shown in **Table 3-21**.

TABLE 3-21
Population by Race in 2000 for Washoe County

	County Population	Percent of Total	State Population	Percent of Total
White	272,985	80.4	1,501,886	75.2
Black or African American	7,093	2.1	135,477	6.8
American Indian or Alaska Native	6,162	1.8	26,420	1.3
Asian	14,526	4.3	90,266	4.5
Native Hawaiian &Other Pacific islander	1,553	0.5	8,426	0.4
Some other race	26,034	7.7	159,354	8.0
2 or more races	11,133	3.3	76,428	3.8
Total Population	**339,486**		**1,99,257**	
Hispanic or Latino (of any race)	56,301	16.6	393,970	19.7
Not Hispanic or Latino	283,185	83.4	1,604,287	80.3
Total Population	**339,486**		**1,999,257**	

Source: Sonoran Institute 2003.

Within Washoe County, approximately 10 percent of the population was below the poverty level in 1999. Within the Reno Sparks Indian Colony, approximately 20 percent lived below the poverty level in 1999, the year for which the most current census data are available. The high poverty rate within the Reno Sparks Indian Colony indicates that a low-income population does exist near the Projects Area (BLM 2003).

PUBLIC INVOLVEMENT AND ENVIRONMENTAL JUSTICE

The environmental justice process encourages a scan prior to public scoping of the Proposed Projects to ensure that minority and low-income populations are included in the range of public involvement activities. Public involvement meets the following requirements of Executive Order 12898:

- Aids in identifying minority and low-income groups.
- Provides the means for these groups to participate in federal decision-making that might affect them.

A full description of the EIS public involvement process can be found in Chapter 1, but persons and organizations known or thought to have a potential interest, including minority, low-income, disadvantaged, and Native American groups, were identified, informed, and given the opportunity to participate in the NEPA process.

CHAPTER 4

CONSEQUENCES OF PROPOSED ACTIONS AND ALTERNATIVES

INTRODUCTION

Potential direct and indirect impacts of construction and operation of proposed water transmission pipelines and associated components (Proposed Actions) on environmental and social and economic resources are discussed in this chapter. This chapter also describes potential direct and indirect impacts of alternatives to the Proposed Actions that are designed to reduce or eliminate potentially adverse impacts resulting from implementation of the Proposed Actions. Detailed descriptions of alternatives to the Proposed Actions are included in Chapter 2.

Implementation of the Proposed Actions would result in irreversible and irretrievable commitments of resources, residual impacts, and cumulative effects.

- Irreversible commitments are those that cannot be reversed, except over a very long period of time.
- Irretrievable commitments are those that are lost for a period of time.
- Residual impacts are those effects remaining after implementation of mitigation measures.
- Cumulative effects result from incremental effects of the Proposed Actions when combined with past, present, and reasonably foreseeable actions.

Implementation of the Proposed Actions and/or Alternative A would cause resources to be consumed, committed, or lost over the course of Projects development and implementation. Nonrenewable resources, such as fossil fuels and non-recyclable materials, would be irreversibly committed during operations.

Where potential impacts associated with the Proposed Actions are unique to either the Fish Springs Ranch Project or the Intermountain Water Supply Project, descriptions of those impacts are distinguished in this section of the EIS. Where potential impacts are common to both Proposed Actions, those impacts are so designated in this section.

BLM has no jurisdictional authority over water rights, pumping rates, distribution, use, and volume of water to be transferred to the North Valleys Planning Area by Fish Springs Ranch and Intermountain Water Supply. The State Engineer has addressed issues pertaining to groundwater withdrawal from Honey Lake Valley, Dry Valley, and Bedell Flat during public hearings associated with application for the respective water rights. Water distribution and

use associated with development of the North Valleys Planning Area resulting from importation of water by Washoe County, Truckee Meadows Water Authority, or private entities has been addressed by local and regional planning agencies in accordance with Nevada statutes. This chapter provides a description of how environmental and social and economic resources would be affected as a result of the Proposed Actions described in Chapter 2.

This chapter outlines potential monitoring and mitigation measures BLM has identified that could be used to reduce or eliminate impacts to resources within the Projects Area. BLM has reviewed all aspects of the Proposed Actions and the following alternatives to Proposed Actions: Alternative A – Construct Pipelines within Common Right-of-Way; and No Action Alternative.

The agency used environmental data collected in the Projects Area and surrounding areas to predict environmental effects that could result from the Proposed Actions and Alternatives. A level of uncertainty is associated with any set of data in terms of predicting impacts, especially where natural systems are involved. Predictions described in this analysis are intended to allow comparison of alternatives to the Proposed Actions, as well as provide a method to determine whether activities proposed by the applicants would be expected to comply with applicable regulations.

GEOLOGY, MINERALS, AND PALEONTOLOGY

SUMMARY

Construction and operation of water transmission pipelines as described in the Proposed Actions would not result in impacts on geology, minerals, or paleontological resources of the Projects Area. Although construction activities may result in loss or destruction of fossils, rock formations in this region of Nevada are not known for containing significant (vertebrate) paleontological resources. If rare plant, vertebrate, or invertebrate fossils are discovered during construction, BLM would be contacted to determine steps necessary to preserve the fossils. Seismic hazards could cause a rupture or failure of the pipelines or damage to related facilities but would not present a threat to public safety.

DIRECT AND INDIRECT IMPACTS

Proposed Actions

Impacts Common to Proposed Actions

Construction and operation of water transmission pipelines as described in the Proposed Actions would not result in impacts on geology, minerals, or paleontological resources of the Projects Area. Construction activities are limited to shallow depths where the primary resource that would be affected is

likewise would not affect geological resources in the Projects Area.

Several of the basins in the Projects Area contain unconsolidated sediment packages comprised of sand, silt, and gravel. Groundwater withdrawal could cause local subsidence where groundwater is removed from interstitial spaces in fine-grained sediment resulting in consolidation of sediment.

Fossil resources generally are considered to be vertebrate fossils. Although construction activities may result in loss or destruction of fossils, this region of Nevada is not known for significant (vertebrate) paleontological resources. If rare plant, vertebrate, or invertebrate fossils are discovered during construction, BLM would be contacted to determine steps necessary to preserve the fossils.

Seismic hazards could cause a rupture or failure of the pipelines or damage to related facilities but would not present a threat to public safety. All construction would be conducted using best management practices including appropriate pipe design and engineering techniques in accordance with all relevant codes.

ALTERNATIVE A – CONSTRUCT PIPELINES WITHIN COMMON RIGHT-OF-WAY

Implementation of Alternative A would result in impacts similar to those described for the Proposed Actions.

NO ACTION ALTERNATIVE

No Action for Fish Springs Ranch Project

Selection of the No Action Alternative would eliminate potential impacts associated with Fish Springs Ranch's Proposed Action on geology, minerals, and paleontological resources.

No Action for Intermountain Water Supply Project

Selection of the No Action Alternative would eliminate potential impacts associated with Intermountain Water Supply's Proposed Action on geology, minerals, and paleontological resources.

MONITORING AND MITIGATION MEASURES

Measures Common to Proposed Actions

Areas that lie within the projected cones of depression for each of the Projects would be monitored to evaluate the occurrence of subsidence induced by groundwater withdrawal. Subsidence zones would be reviewed to determine whether surface features or infrastructure would require remediation based on soil consolidation and surface effects.

If rare plant, vertebrate, or invertebrate fossils are discovered during construction, BLM would be contacted to determine steps necessary to preserve the fossils.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Common to Proposed Actions

No irreversible or irretrievable commitment of geologic, mineral, or paleontological resources would result from the Proposed Actions or Alternatives.

RESIDUAL EFFECTS

Effects Common to Proposed Actions

No residual effects on geologic, mineral, or paleontological resources would result from construction of the pipelines and associated facilities.

AIR RESOURCES

SUMMARY

The Proposed Actions include the Fish Springs Ranch and Intermountain Water Supply proposals for construction of wells, water transmission pipelines, and associated components. In addition, the Fish Springs Ranch Proposed Action includes construction of an electrical substation on private land adjacent to the Alturas 345 kV transmission line. Construction activities would generate temporary emissions consisting primarily of fugitive dust (particulate matter) and gaseous engine emissions from drill rigs, construction equipment, and vehicles. Fugitive dust and gaseous emissions from the Proposed Actions would be emitted at or near ground level and would not have the potential to affect air quality or visibility in any Class I areas.

Implementation of the Fish Springs Ranch Proposed Action would eliminate operation of existing diesel-powered electrical generators used to power groundwater pumps for irrigation and ranch operations thereby eliminating these sources of emissions.

DIRECT AND INDIRECT IMPACTS

Proposed Actions

Impacts Common to Proposed Actions

The Proposed Actions would include well drilling and construction of water transmission pipelines, pump stations and storage tanks. Construction activities would result in land disturbance. Revegetating disturbed areas after construction is included in both proposals. Construction activities would generate road dust from traffic on paved and unpaved roads, fugitive dust from construction activities, and gaseous emissions from drill rigs, construction equipment, and vehicles. Blasting would be a temporary source of particulate matter and gaseous pollution, if used during pipeline construction.

Particulate Emissions

Construction of pipelines and associated facilities would result in temporary emissions of fugitive dust containing PM_{10} and $PM_{2.5}$ particulate matter. Fugitive dust emissions would dissipate following completion of construction. Particulate matter from construction would be emitted at ambient temperature and at ground level. Dust would have little buoyancy and would not be expected to travel great distances from the generation site. Emissions from construction activities would not likely impact measurements at ambient PM_{10} and $PM_{2.5}$ monitors located in Reno and surrounding suburban areas nor travel far enough to impact the nearest Class I airshed.

Gaseous Emissions

Temporary gaseous emissions would be generated during construction of the Projects, including sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen oxides (NOx), and volatile organic compounds (VOC) from diesel-powered well-drilling and construction equipment. SO_2 emissions would be limited by state and federal regulations which limit the amount of sulfur in diesel fuel. Other gaseous emissions from diesel engines would be minimized through proper operation and maintenance. If blasting is used for pipeline construction, ammonium nitrate and fuel oil (ANFO) would be a source of gaseous pollutants. ANFO blasting can cause fugitive emissions of NOx, CO, and SO_2.

Impacts Unique to Fish Springs Ranch Project

The Fish Springs Ranch proposal includes construction of an electrical substation on private land adjacent to the existing Alturas 345 kV transmission line. Electrical motors would replace existing diesel-fired well field pumps and provide power to the pump station, thereby eliminating gaseous emissions from these sources. Estimated reduction in NOx emissions resulting from elimination of the diesel-powered generators at Fish Springs Ranch would range up to 1,000 lbs/day during the irrigation season. In addition, installation of the electrical substation would eliminate all existing Fish Springs Ranch generator set's these sources of emissions to the airshed.

Impacts Unique to Intermountain Water Supply Project

Emissions from diesel-powered generators at proposed wells and pump stations would be subject to Nevada's air quality permitting requirements as implemented and enforced by the Washoe County District Health Department Air Quality Management Division. This effect would be short-term because electrical power would be installed in Phase 2 of the Project. Following installation of electrical power, the diesel-powered generators would be used as backup power sources in case of electrical power failure.

The generators at each of the Dry Valley wells and pump station would be typical 500 kVA (kilo Volt-Amperes) units powered by 750 HP diesel engines. The Bedell Flat well would use a typical 100 kVA generator powered by a 105 HP diesel motor. The generators would

operate at full load only when starting the pumps. During pump operations, generators would operate at approximately 50 percent of full load. During Phase 2, the back-up generators would be tested for approximately half-hour each week to ensure availability during an emergency. A conservative annual estimate of generator emergency operations has been based on 720 hours per year. Estimated generator emissions during each operating phase are shown in **Table 4-1.**

ALTERNATIVE A – CONSTRUCT PIPELINES WITHIN COMMON RIGHT-OF-WAY

Particulate and gaseous emissions would be less under Alternative A as surface disturbance needed for pipeline construction would be less. Emissions from existing groundwater pumping equipment would remain at current levels.

TABLE 4-1
Estimated Annual Emissions from Diesel Generators
Intermountain Water Supply Project

Generator	Operating Parameters (hp-hr)			Estimated Annual Emissions (tons/year)					
	Hourly	Daily	Annual	PM	PM_{10}	NOx	SO_2	CO	VOC
Phase 1 – Routine Operations									
Dry Valley #1[1]	750	9,000	3,285,000	1.15	1.15	21.3	6.64	9.03	1.16
Pump Station[1]	750	9,000	3,285,000	1.15	1.15	21.3	6.64	9.03	1.16
			Total Emissions:	**2.30**	**2.30**	**42.7**	**13.3**	**18.7**	**2.32**
Phase 2 – Routine Operations									
Dry Valley #1[1]	750	188	68,620	0.02	0.02	0.45	0.14	0.19	0.02
Dry Valley #2[1]	750	188	68,620	0.02	0.02	0.45	0.14	0.19	0.02
Pump Station[1]	750	188	68,620	0.02	0.02	0.45	0.14	0.19	0.02
Bedell Flat Well[2]	105	26	9,490	0.01	0.01	0.15	0.01	0.03	0.01
			Total Emissions:	**0.08**	**0.08**	**1.49**	**0.43**	**0.60**	**0.08**
Phase 2 – Emergency Operations[3]									
Dry Valley #1[1]	750	9,000	270,000	0.09	0.09	1.76	0.55	0.74	0.10
Dry Valley #2[1]	750	9,000	270,000	0.09	0.09	1.76	0.55	0.74	0.10
Pump Station[1]	750	9,000	270,000	0.09	0.09	1.76	0.55	0.74	0.10
Bedell Flat Well[2]	105	1,260	37,800	0.04	0.04	0.59	0.04	0.13	0.05
			Total Emissions:	**0.33**	**0.33**	**5.85**	**1.67**	**2.35**	**0.33**

[1] Emissions factors from EPA AP-42, Section 3.4. NOx emission factors timing retard control.

[2] Emission factors from EPA AP-42, Section 3.3.

[3] Annual emergency operation emissions based on 720 hours of operation at 50 percent load.

Note: hp-hr = horsepower per hour; PM = particulate matter; PM_{10} = 10-micron size particulate matter; NOx = nitrogen oxides; SO_2 = sulfur dioxide; CO = carbon monoxide; VOC = volatile organic compounds.

NO ACTION ALTERNATIVE

No Action for Fish Springs Ranch Project

Selection of the No Action Alternative would eliminate potential impacts associated with Fish Springs Ranch's Proposed Action on air quality. Gaseous emissions from operation of existing diesel-fired electrical generators for irrigation pumps likely would continue.

No Action for Intermountain Water Supply Project

Selection of the No Action Alternative would eliminate potential impacts associated with Intermountain Water Supply's Proposed Action on air quality.

MONITORING AND MITIGATION MEASURES

Measures Common to Proposed Actions

Fugitive dust emissions from construction activities would be minimized through common construction practices. Diesel-fired electrical generators would be subject to regulation through state and local air quality permitting programs. Permitted equipment would be required to meet applicable emission standards and control requirements. Emissions from blasting agents would be limited by restricting its use to the extent possible. No additional monitoring and mitigation measures beyond those required by state of Nevada and Washoe County requirements have been identified for either Proposed Action.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Common to Proposed Actions

No irreversible or irretrievable commitment of air resources would result from the Proposed Actions or Alternatives.

RESIDUAL EFFECTS

Effects Common to Proposed Actions

No residual effects on air resources would be anticipated resulting from construction of the pipelines and associated facilities. Diesel-powered electrical generation equipment associated with the Intermountain Water Supply Project would eventually be replaced by electrical power.

WATER RESOURCES

SUMMARY

Potential impacts to surface water and groundwater resources from the proposed Fish Springs Ranch and Intermountain Water Supply Rights-of-Way Projects are evaluated in this section. Groundwater would be removed at the proposed volumes as authorized by the State Engineer using production wells located in three

basins: Honey Lake Valley = 8,000 acre-feet per year (af/yr); Dry Valley = 3,000 af/yr; and Bedell Flat = 500 af/yr. Water from the wells would be transported in buried pipelines to the Lemmon Valley/Stead area north of Reno/Sparks.

General types of surface water impacts that may occur include: temporary disturbance of drainages during construction of the buried water transmission pipelines; accidental releases of hydraulic fluid, fuel, or oil; and reduced stream flow where groundwater drawdown from production well pumping is connected to surface water (e.g., springs and seeps). Potential impacts to groundwater from the Proposed Actions include: temporary and localized disturbance to areas of shallow groundwater intercepted by pipeline trenching; creating a groundwater cone-of-depression around the pumping wells in each basin; lowering the groundwater table in each basin; land subsidence caused by lowering groundwater levels; and changes in salinity or total dissolved solids resulting from groundwater movement induced by the pumping wells.

DIRECT AND INDIRECT IMPACTS

Proposed Actions

Impacts Common to Proposed Actions

Water resource impacts common to the proposed Fish Springs Ranch and Intermountain Water Supply projects can be divided into three general categories: (1) impacts to surface water features resulting from installation of approximately 38 and 24 miles of underground piping for water transmission, respectively, and additional surface disturbance from wells, pump stations, storage tanks, and associated appurtenances; (2) impacts to groundwater and/or surface water resources resulting from groundwater withdrawal via wells in eastern Honey Lake Valley, western Dry Valley, and central Bedell Flat; and (3) impacts to water resources in areas where the water would be distributed (i.e., Lemmon Valley and Stead north of Reno/Sparks Nevada).

The Proposed Actions would result in 395 acres of surface disturbance for the Fish Springs Ranch Project and 225 acres for the Intermountain Water Supply Project. Portions of the pipeline routes included in the Proposed Actions would occur adjacent to previously reclaimed land associated with the Tuscarora Natural Gas Pipeline.

Implementation of the Proposed Actions would allow inter-basin groundwater transfer of up to 8,000 af/yr from the Honey Lake Valley hydrographic area (no. 97), 3,000 af/yr from the Dry Valley hydrographic area (no. 95), and 500 af/yr from the Bedell Flat hydrographic area (no. 94) as authorized by the State Engineer.

Water Resource Impacts from Piping Installation

Separate water transmission pipelines for Fish Springs Ranch (38 miles) and Intermountain Water Supply (24 miles) would share the same right-of-way for approximately 13 miles (2 miles in Dry Valley, 6 miles in Bedell Flat, and 5 miles in Antelope Valley). Approximately 16 miles of the Fish Springs Ranch pipeline corridor, and 10 miles of the Intermountain Water Supply pipeline corridor would be located adjacent to the Tuscarora Gas Pipeline right-of-way (8 miles of this Tuscarora Gas Pipeline corridor

would be shared by both Fish Springs Ranch and Intermountain Water Supply in portions of Dry Valley and Bedell Flat).

The proposed water transmission pipelines for Fish Springs Ranch and Intermountain Water Supply would cross approximately 70 drainage channels (**Figure 3-6**). The pipeline would be buried to depth of about 4 to 6 feet below ground surface, except at some of the larger stream channel crossings where burial depth may be greater to avoid channel scouring effects. These larger stream channel crossings likely would occur at Dry Valley Creek, North Fork Dry Valley Creek, and South Fork Dry Valley Creek. Most of the remaining drainages are small ephemeral channels that contain flow only during brief periods of sufficient rainfall and/or snowmelt.

Pipeline construction across some stream channels may occur when there is flow in the channels, which would require mitigation measures to prevent adverse impacts from erosion and sedimentation (see "*Monitoring and Mitigation Measures*" section). Time required to construct the pipeline across each stream channel would be short, followed by immediate reclamation to restore the channel to near pre-disturbance conditions. Based on USGS topographic maps, the following list indicates the number of stream channels that would be crossed by the shared water transmission pipeline corridors for Fish Springs Ranch and Intermountain Water Supply (**Figure 3-6**):

- *Dry Valley – Shared Pipeline Corridor (2 miles)*: 6 ephemeral channels + South Fork Dry Valley Creek; these locations are near the valley bottom where the channels do not have perennial flow.
- *Bedell Flat – Shared Pipeline Corridor (6 miles)*: 13 ephemeral channels; most locations are near the valley bottom where perennial flow does not occur.
- *Antelope Valley – Shared Pipeline Corridor (5 miles)*: no substantial drainage channel crossings.

Accidental releases of hydraulic fluid, fuel, or oil could impact surface water and/or groundwater if the releases occurred in or adjacent to a water body or in areas of shallow groundwater. Because of the minimal extent of surface water and shallow groundwater in the proposed construction areas, only minor localized impacts would likely occur if such releases occurred, assuming the releases are small volume (e.g., <100 gallons). Standard operating procedures and best management practices as part of all construction activities would minimize erosion and sedimentation impacts, as well as spills of petroleum products (see "*Monitoring and Mitigation Measures*" section).

No other impacts to groundwater and springs would be expected from proposed pipeline construction activities. Due to the relatively shallow pipeline burial depth, groundwater would not be encountered in most trenches, except in some valley bottoms where shallow groundwater is present in unconsolidated deposits. Pipeline construction in these areas could result in temporary and localized disturbance to the water table. The quality and quantity of this groundwater would not be diminished from this short-term disturbance.

Groundwater Impacts from Water Supply Well Pumping

Impacts to groundwater quality and quantity resulting from the proposed groundwater pumping wells in eastern Honey Lake Valley, west-central Dry Valley, and northwestern Bedell Flat have been estimated using computer groundwater models. Descriptions of the models and results are contained in the following sections: "*Impacts Unique to Fish Springs Ranch Project*" and "*Impacts Unique to Intermountain Water Supply Project*". Additionally, **Appendix C** contains summaries of groundwater models for the three basins, including figures showing results of groundwater drawdown predictions for years 1, 10, and 100.

In general, impacts to groundwater quantity would consist of removing groundwater at the proposed volumes from three basins (Honey Lake Valley, Dry Valley, and Bedell Flat) and transferring this water to the Lemmon Valley/Stead area. Proposed groundwater withdrawal rates are 8,000 af/yr for eastern Honey Lake Valley, 3,000 af/yr for western Dry Valley, and 500 af/yr for central Bedell Flat. Groundwater removal would create a cone-of-depression (zone of influence) around the pumping wells in each basin, whereby the water table is lowered to provide a hydraulic gradient that allows groundwater to move to the wells. The magnitude and extent (vertical and lateral) of this cone-of-depression are dependent upon each well's pumping rate and hydraulic characteristics of the aquifer, including hydraulic conductivity, transmissivity, storativity, recharge and discharge locations, confining zones, and other boundary conditions.

A groundwater cone-of-depression would expand in time after startup or increase in pumping until a balance is reached between recharge and discharge within the radius of influence. In general, if the volume of groundwater removed from pumping wells and other discharges is equivalent to or less than the groundwater recharge rate within a given basin, then there is no net removal of the groundwater resource. In Nevada, withdrawal of groundwater from a basin is limited by law to the estimate of "perennial yield" (Nevada Revised Statutes 533.271). Perennial yield is the "maximum amount of natural groundwater discharge that can be salvaged each year over the long-term by pumping without bringing about some undesired result" (Nevada State Engineer 1974).

Groundwater models calculate and graphically depict the expanding cone-of-depression over time, as well as predict if and when drawdown ceases due to a balance between groundwater recharge and discharge. The models simulate withdrawal of groundwater from each pumping well on an annual basis, incorporating hydrologic balance information and aquifer characteristics. Several assumptions and estimated data are used in the models; therefore, results should be considered approximations of future conditions based on one or more pumping scenarios. The models used for this EIS are widely accepted in the scientific community and the results are based on best available data. Comments on the previous models completed for Honey Lake Valley are summarized in **Appendix C**.

Any reductions of water within Pyramid Lake Paiute Tribal land, and possibly other area Tribes, as a result of proposed pumping in

Honey Lake Valley, Dry Valley, and Bedell Flat may infringe upon Winter's Doctrine water held by the Tribe(s). These potential effects are described later in this section in the context of estimated changes in groundwater flow to nearby basins that contain Tribal land.

Groundwater models also can be used to simulate water quality changes that may result from pumping. For this Project, however, potential changes to groundwater quality were not predicted using numeric models, but were evaluated using existing water quality data and analyses. In general, potential groundwater quality impacts are associated primarily with changes in salinity or total dissolved solids (TDS) resulting from groundwater movement induced by the pumping wells. These effects are described for each basin in the following sections: "*Impacts Unique to Fish Springs Ranch Project*" and "*Impacts Unique to Intermountain Water Supply Project*".

Lowering groundwater levels due to pumping can cause ground subsidence within the cone-of-depression or zone of influence. Subsidence can only occur where groundwater drawdown occurs in unconsolidated sediments, namely valley fill deposits in Honey Lake Valley, Dry Valley, and Bedell Flat. For the "Bedell Flat Pipelines Rights-of-Way Draft EIS" (BLM 1993), a range of subsidence was estimated using assumed rock properties, including an extensive deposit of compressible sandstone, siltstone, and claystone. Ground fissures have been reported approximately 6 miles north of Fish Springs Ranch (BLM 1993). These fissures may have been caused by irrigation pumping that has been occurring at Fish Springs Ranch, fault creep, and/or desiccation cracks caused by prolonged drought.

Subsidence can damage buildings by cracking foundations. As there are few buildings (houses, barns, garages, etc.) on valley fill deposits in eastern Honey Lake Valley, Dry Valley, or Bedell Flat, the potential for impacts to foundations is minimal. A housing subdivision is located in southern Bedell Flat (Red Rock Estates). Groundwater drawdown predicted for this area (up to 9 feet) would occur in bedrock (incompressible) rather than valley fill deposits.

Using methodology described by BLM (1993) in the "Bedell Flat Pipelines Rights-of-Way Draft EIS", up to about 2 feet of subsidence could occur within a radius of approximately 2 miles from the Fish Springs Ranch production wells using a withdrawal rate of 8,000 af/yr. This assumes silty sand is the predominant material for valley fill. Potential subsidence would increase for areas where clay is the predominant material (not common over large areas in Projects Area). Subsidence decreases logarithmically from the center of groundwater pumping (BLM 1993); therefore, there is little potential for subsidence beyond about 2 miles from the proposed pumping wells. Subsidence could also occur with continued pumping at Fish Springs Ranch for irrigation purposes.

Surface Water Impacts from Water Supply Well Pumping

Impacts to surface water quantity and/or quality can occur from groundwater pumping in areas where groundwater is connected to surface water. Such connections can occur where sufficient flow from springs, seeps, or artesian-flowing wells contribute to surface water flow downgradient from the discharge points. In addition, some streams gain flow where

channels intersect the groundwater table. Some of these groundwater discharges occur only seasonally when the water table is highest, usually during Spring. As the cone-of-depression in groundwater expands around the pumping well(s), discharge at springs, seeps, and/or stream channels within the zone of influence may decrease or cease.

Impacts to surface water quality could result if groundwater pumping causes poorer quality groundwater to move from portions of the groundwater system not associated with surface water to areas where groundwater discharges to surface water. In these cases, springs or streams could experience higher concentrations of TDS and salinity. Potential effects to surface water quantity and/or quality are described for each basin in the following sections: "*Impacts Unique to Fish Springs Ranch Project*" and "*Impacts Unique to Intermountain Water Supply Project*".

Impacts Unique to Fish Springs Ranch Project

Groundwater would be pumped at up to 8,000 af/yr from six supply wells in southeastern Honey Lake Valley in the Fish Springs Ranch area (**Figure 3-1**). For purposes of comparison, baseline conditions are assumed to occur in year 2003 where groundwater pumping from five irrigation wells at Fish Springs Ranch occurred at a total rate of about 4,200 af/yr.

Groundwater Impacts for Fish Springs Ranch Project

Groundwater Quantity

Several groundwater models have been developed for eastern Honey Lake Valley over the past 15 years. Summaries of these models are included in **Appendix C**. In 1990, the USGS (Handman *et al.* 1990) developed a four-layer finite difference flow model using MODFLOW®. This model was used by the USGS to simulate withdrawal of groundwater from five irrigation wells at a rate of 5,900 af/yr for 1988 baseline conditions, and withdrawal from 18 wells at a rate of 15,000 af/yr for potential development conditions. The original USGS MODFLOW model for eastern Honey Lake Valley was modified in 1993 for the "Bedell Flat Pipelines Rights-of-Way Draft EIS" (BLM 1993), simulating 13,000 af/yr of groundwater withdrawal from wells at Fish Springs Ranch and 2,000 af/yr from wells at the Sierra Army Depot. The 1993 model extended the model boundary approximately 3 miles to the west relative to the 1990 USGS model boundary to incorporate the Depot. Moll (2000) completed a new MODFLOW model for southeastern Honey Lake Valley as part of an M.S. Thesis for the University of Nevada-Reno.

William E. Nork, Inc. (1991) developed a finite-element model for eastern Honey Lake Valley. A solute transport model was completed by Bohm (1991) to evaluate effects of pumping on groundwater quality at Fish Springs Ranch. The groundwater flow model completed for the "Bedell Flat Pipelines Rights-of-Way Draft EIS" (BLM 1993) also includes a solute transport

model to evaluate groundwater quality effects from pumping.

Comments on the original 1990 USGS model and modified 1993 model have been documented by Mayo and Slosson (1991, 1992) and Principia Mathematica Inc. (1993). Summaries of these reports are included in **Appendix C**.

In 2004, Lahontan GeoScience, Inc. (Lahontan 2004) modified the original 1990 USGS MODFLOW model to simulate pumping groundwater from six wells at Fish Springs Ranch at a combined rate of 8,000 af/yr. The 2004 model shifted the western model boundary approximately 5 miles to the east relative to the original 1990 USGS model boundary (because of a groundwater divide identified at this location), and used general head boundary cells to represent the western model boundary. Results of Lahontan's 2004 model are presented in this EIS to represent the Proposed Action pumping for Fish Springs Ranch (i.e., 8,000 af/yr). Prior to completing this model, Lahontan (2000) ran the original 1990 USGS MODFLOW model at pumping rates of 5,900 af/yr (1988 conditions), 8,000 af/yr, 10,000 af/yr, and 15,000 af/yr using the same hydrologic data used by the USGS (Handman *et al.* 1990). In 2003, Lahontan (2003) completed a sensitivity analysis of predicted groundwater outflow to Pyramid Lake Valley using the 1990 USGS version of the MODFLOW model.

Hydrologic budgets used in Lahontan's 2004 groundwater model (Proposed Action) and for baseline conditions (2003) are presented in **Table 4-2**. These water budgets show that total recharge and discharge rates are similar between the baseline condition in year 2003 and the Proposed Action of increasing total pumping rates to 8,000 af/yr. For the Proposed Action, there would be no irrigation return flow which will reduce recharge. For discharge components, the Proposed Action uses a lower groundwater evapotranspiration rate (6,280 af/yr) versus the rate estimated for year 2003 baseline conditions (10,400 af/yr). This difference is due to declining evapotranspiration as the water table is lowered from pumping 8,000 af/yr. The 2004 model incorporates changes in the extinction depths for phreatophytes (30 feet everywhere except 12 feet in playas, versus 24 feet for most of the 1990 USGS model area) and the maximum evapotranspiration rate (40 in/yr versus 48 in/yr used in the 1990 USGS model) (Handman *et al.* 1990; Walker & Associates 2004).

Historical groundwater use since the mid-1980s at Fish Springs Ranch has consisted primarily of pumping from five wells (Hodges, Wilson, Headquarters, Jarboe, and Ferrel) for irrigation purposes (**Figure 3-5**). **Table 4-3** shows pumping rates from these wells for 2003 which total about 4,200 af/yr. Estimated irrigation return flow for this water usage also is shown in **Table 4-3**. The Proposed Action includes a total pumping rate of 8,000 af/yr which would be distributed among the five wells as shown in **Table 4-3**. A sixth production well may be used, but the maximum combined pumping rate of 8,000 af/yr would not change.

TABLE 4-2
Hydrologic Budget for Groundwater Flow Model at Eastern Honey Lake Valley

Recharge and Discharge	Budget Component	Estimated Quantity (acre-feet per year)	
		2003 Conditions	Proposed Action Conditions
Recharge	Direct Infiltration of Precipitation	8,411	8,411
	Infiltration of Surface Runoff	11,890	11,886
	Irrigation Return	1,046	0
	Groundwater Inflow from West (Honey Lake Area)	30	31
Total Recharge		**21,377**	**20,328**
Discharge	Groundwater Evapotranspiration	10,400	6,280
	Withdrawal from Wells	4,202	7,997
	Groundwater Outflow Northeast to Smoke Creek Desert via Sand Pass	5,278	4,707
	Groundwater Outflow East to Pyramid Lake Valley via Astor Pass	1,481	1,328
	Groundwater Outflow West to Honey Lake Area	17	16
Total Discharge		**21,378**	**20,328**

Source: Lahontan 2004

TABLE 4-3
Existing and Proposed Pumping Rates at Fish Springs Ranch

Well	Total Pumping Volume (ac-ft/yr)	Pumping Volume from Model Layer 1	Pumping Volume from Model Layer 2	Irrigation Return Flow (ac-ft/yr)
Irrigation Pumping at Fish Springs Ranch in 2003 (Baseline Condition)				
Hodges	544	544	0	136
Wilson	1,005	0	1,005	251
Headquarters	1,549	1,146	403	387
Jarboe	712	356	356	178
Ferrel	377	377	0	94
TOTAL	4,187	2,423	1,764	1,046 (25% of pumping)
Proposed Action Pumping at Fish Springs Ranch				
Hodges	2,000	668	1,332	0
Wilson	2,000	668	1,332	0
Headquarters	2,000	668	1,332	0
Jarboe	1,200	400	800	0
Ferrel	800	266	534	0
TOTAL	8,000	2,670	5,330	0

Source: Lahontan 2004

Note: See **Figure 3-5** for locations of irrigation wells.

Table 4-3 shows the amount of water that would be pumped from each of the upper two model layers (aquifers). Approximately one-third of project pumping was assigned to Layer 1 and two-thirds to Layer 2. Layer 1 includes the upper water table aquifer ranging from approximately 3,700 to 4,050 feet in elevation, consisting of fine-grained deposits (clay, silt, sand) in the center of the basin, and coarser-grained alluvial deposits (silt, sand, gravel) that surround the valley floor at the base of the mountains. Layer 2 consists almost entirely of fine-grained lake-bed sediments except where volcanic rocks are present, all of which range in elevation from about 3,000 to 3,700 feet.

The proposed pumping rate of 8,000 af/yr at Fish Springs Ranch is predicted to cause drawdown of the water table in eastern Honey Lake Valley. Maximum steady-state groundwater drawdown contours for 8,000 af/yr pumping are shown on **Figure 4-1**. The drawdown is calculated by subtracting predicted groundwater surface elevations from baseline conditions in 2003 where net irrigation withdrawals at Fish Springs Ranch were about 3,100 af/yr (total withdrawal minus return flow; **Table 4-3**). Based on recent model predictions using a total groundwater pumping rate of 8,000 af/yr (Lahontan 2004), the amount of groundwater drawdown would be up to about 30 feet (at 100 years) near the production wells at Fish Springs Ranch, to <1 foot at distances of about 1 to 5 miles west and north of the production wells (**Figure 4-1**). Maximum drawdown at the state-line would be 1 foot or less, with no drawdown predicted more than 4 miles west of the state-line, coincident with the groundwater divide shown on **Figure 4-1** (Lahontan 2004). No impacts would occur to Honey Lake and the Sierra Army Depot area which are about 5 to 10 miles west of the state-line. Maximum drawdown predicted at Astor Pass near Pyramid Lake Valley, and Sand Pass near Smoke Creek Desert, would be approximately 15 feet and 10 feet, respectively.

Figures C-1 and **C-2 (Appendix C)** are hydrographs of groundwater drawdown versus time (0 to 100 years) developed using Lahontan's 2004 model for a well in the Sand Pass and Astor Pass area and a well in the Fish Springs Ranch area, respectively. The Pass area well shows drawdown of about 1 foot at year 10 and 9 feet at year 100. The Ranch area well shows about 6 feet of drawdown at year 1 and 15 feet of drawdown at year 100; this well is not located in the area of maximum groundwater drawdown at Fish Springs Ranch. **Figures C-3, C-4,** and **C-5 (Appendix C)** show the distribution of groundwater drawdown in Layer 1 throughout eastern Honey Lake Valley in plan view for 1, 10, and 100 years, respectively, after initiation of pumping 8,000 af/yr. According to Lahontan (2004), 95 percent of total groundwater drawdown in the pumping center is achieved after 100 years of pumping.

Based on model predictions for proposed pumping of 8,000 af/yr at Fish Springs Ranch, groundwater outflow to Pyramid Lake Valley via Astor Pass would be reduced by about 150 af/yr or 10 percent of baseline conditions (**Table 4-2**). Approximately 1,500 af/yr of groundwater is estimated to flow naturally from eastern Honey Lake Valley eastward to Pyramid Lake Valley (Handman *et al.* 1990). According to Lopes and Evetts (2004) of the USGS, total natural groundwater recharge in Pyramid Lake Valley is 6,600 af/yr. The predicted

groundwater flow reduction of 150 af/yr to Pyramid Lake Valley from proposed pumping at Fish Springs Ranch, therefore, is about 2 percent of total groundwater recharge in Pyramid Lake Valley. According to the USGS (Lopes and Evetts 2004), current groundwater pumping in Pyramid Lake Valley totals about 380 af/yr.

It is not known how much groundwater flow in Pyramid Lake Valley recharges Pyramid Lake; however, it is likely that the lake is a major discharge point for groundwater recharged from the surrounding mountains. The model is based on a lake elevation measured in 1988 (3792 feet); however, if the current higher elevation of the lake (3810 feet in July 2003) was used in the model, the predicted outflow to Pyramid Lake Valley via Astor Pass would decrease.

Average annual flow of the Truckee River into Pyramid Lake is approximately 410,000 af/yr for the period of 1958-2002, with a range of 17,000 to 2,000,000 af/yr (USGS 2005). The predicted reduction of 150 af/yr from the proposed pumping at Fish Springs Ranch is about 0.04 percent of the average annual Truckee River flow into Pyramid Lake, and about 0.8 percent of the lowest annual stream flow recorded.

Groundwater outflow to Smoke Creek Desert via Sand Pass would be reduced by about 570 af/yr or 11 percent of baseline conditions (**Table 4-2**). Approximately 5,300 af/yr of groundwater is estimated to flow naturally from eastern Honey Lake Valley northeastward to Smoke Creek Desert (Handman *et al.* 1990). According to Lopes and Evetts (2004) of the USGS, total natural groundwater recharge in Smoke Creek Desert is 13,000 af/yr. The predicted groundwater flow reduction of 570 af/yr to Smoke Creek Desert from proposed pumping at Fish Springs Ranch, therefore, is about 4 percent of total groundwater recharge in Smoke Creek Desert. According to the USGS (Lopes and Evetts 2004), current groundwater pumping in Smoke Creek Desert totals 920 af/yr.

An estimated 2,600 af/yr of groundwater may flow from Smoke Creek Desert to Pyramid Lake Valley (BLM 1993). The proposed pumping at Fish Springs Ranch could eventually reduce this amount by about 500 af/yr based on a proportion of the reduction estimated by BLM (1993) for pumping 13,000 af/yr. If 500 af/yr is added to the reduction of 150 af/yr described previously for the Proposed Action, total groundwater flow reduction to Pyramid Lake Valley could be 650 af/yr, or about 10 percent of total groundwater recharge (6,600 af/yr) estimated for Pyramid Lake Valley.

Some investigators of the eastern Honey Lake Valley hydrologic system believe there is little or no groundwater flow to Smoke Creek Desert and Pyramid Lake Valley (Bohm 1990; Moll 2000; Varian 1997). If this is the case (i.e., no-flow boundary at the eastern basin margin), then the proposed pumping at Fish Springs Ranch likely would not affect groundwater in these basins, and the water balance for Honey Lake Valley would need to be adjusted for reduced outflow from the basin. Moll (2000) excluded groundwater flow to Smoke Creek Desert and Pyramid Lake Valley from her model with groundwater drawdown predictions in eastern Honey Lake Valley that are similar to those presented in **Figure 4-1** for the Proposed Action using a pumping rate of 8,000 af/yr.

EIS\north_valley\arcmap\draft_eis\honey_drawdown.mxd

P Proposed Pump Station
Proposed Pumping Wells
Proposed Pipeline Route
Tuscarora Natural Gas Pipeline
Spring or Seep > 4100 ft. Elev.
Spring or Seep < 4100 ft. Elev.
Contour of Predicted Maximum Drawdown (feet) In Layer 1 After Pumping 8,000 acre-feet/yr

Public Ownership
Bureau of Indian Affairs
Bureau of Land Management
Department of Defense
Forest Service
State of California
Susanville Indian Ranchera (SIR)
Potential Habitat for Carson Wandering Skipper

N
0 Miles 4

Maximum Groundwater Drawdown at Steady State Predicted in East Honey Lake Valley
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 4-1

Groundwater Quality

As stated previously, potential groundwater quality impacts are associated primarily with changes in salinity or TDS resulting from groundwater movement induced by the pumping wells. For eastern Honey Lake Valley, sodium, chloride and TDS increase toward the center of the basin; the playa areas are groundwater sinks where evaporation causes high salinity. TDS concentrations in groundwater near the eastern Honey Lake Valley playa area are up to 50,000 mg/L (BLM 1993). In the vicinity of the proposed Fish Springs Ranch production wells southeast of the playa, TDS in groundwater ranges from about 200 to 500 mg/L. Groundwater in the Sand Pass and Astor Pass areas has TDS in the range of 1,600 to 2,500 mg/L (BLM 1993). Concentrations of metals from the Fish Springs Ranch irrigation wells are low; however, arsenic is elevated (0.039 mg/L versus standard of 0.01 mg/L to be implemented in January 2006) in the well located nearest the playa (Wilson well).

A water quality model was completed for the "Bedell Flat Pipelines Rights-of-Way Draft EIS" (BLM 1993) to predict changes in groundwater quality in eastern Honey Lake Valley. Results of this analysis show that TDS would increase by about 100 mg/L about 2 miles east of the center of Honey Lake Valley playa 100 years after initiation of pumping 13,000 af/yr at Fish Springs Ranch. TDS to the east and south of the playa boundary would increase less than 60 mg/L and 40 mg/L, respectively (BLM 1993). A slight increase in TDS at Astor Pass averaging 40 mg/L is predicted for the 13,000 af/yr pumping rate; however, no TDS increases would occur at the Sand Pass area (BLM 1993). Given these TDS increases predicted for a pumping rate of 13,000 af/yr, the proposed pumping rate of 8,000 af/yr for the current Proposed Action would be expected to result in lower TDS increases, possibly in the range of about 40 percent compared to the concentration changes discussed above.

<u>Sierra Army Depot Area</u>

Concern has been raised by the U.S. Army that pumping at Fish Springs Ranch could adversely affect groundwater remediation activities at the Sierra Army Depot in central Honey Lake Valley, California. Groundwater contamination studies and remediation activities have been on-going for over 10 years at the Sierra Army Depot, primarily as a result of historic releases of petroleum products and solvents. Results of the 2004 groundwater model for Fish Springs Ranch pumping shows that no drawdown would occur in the Sierra Army Depot area at a pumping rate of 8,000 af/yr (**Figure 4-1**). Two production wells for the Herlong Water and Wastewater Project were installed approximately 3½ miles west of Herlong and will be pumped initially at rates of about 1,300 af/yr (108 af/month) and may have an affect on groundwater flow direction in the Depot area.

Impacts to Springs and Flowing Wells for Fish Springs Ranch Project

Table 4-4 summarizes the springs and flowing wells that could be impacted by proposed pumping at Fish Springs Ranch. These features are shown on **Figure 4-1**, along with the model prediction of groundwater drawdown contours. Only those springs and flowing wells located within the groundwater zone of influence and below an elevation of 4,100 feet amsl are considered for this impact analysis because the regional water table in eastern Honey Lake Valley has an uppermost elevation

of about 4,050 feet amsl (i.e., used for Layer 1 in model). Springs and flowing wells located above this elevation are assumed to be associated with localized groundwater systems in the mountains that are not connected to the regional valley flow systems.

Potential impacts to springs and flowing wells include reduced or eliminated flow, changes in water quality, and reduced riparian vegetation if present. The magnitude of impact to a spring or flowing well, if any, would depend on: (1) whether the source of water would be connected to the aquifer supplying water to the production wells; (2) magnitude of drawdown in relation to the hydraulic head at the spring or well; and (3) location of poorer quality groundwater in proximity to the spring or well.

Two general categories of springs and wells are presented in **Table 4-4**: (1) spring or flowing well is present, along with a riparian zone; and (2) spring or well has ceased flowing, but a riparian zone is present. The primary group of flowing springs and wells that could be affected by groundwater pumping at Fish Springs Ranch consists of the 10 wells and five springs located in southern Smoke Creek Desert (HLV-168 through HLV-183, excluding HLV-170 and HLV-181, in **Table 4-4** and on **Figure 4-1**). According to groundwater model results, all of the noted springs and wells in southern Smoke Creek Desert may be subject to 5 to 10 feet of groundwater drawdown due to the proposed pumping of 8,000 af/yr. Most of these sites have thermal water discharges at flow rates of <1 to 145 gal/min. Assuming 5 to 10 feet of drawdown does eventually occur in this part of Smoke Creek Desert, the flowing springs and wells could experience flow reductions. The magnitude of impact, if any, would depend on the source's connection with the aquifer subject to production well pumping, and the head or water pressure at each spring and flowing well.

Total riparian or wetland area associated with the springs and flowing well sites in southern Smoke Creek Desert is in the range of 20 to 70 acres (Westech 2004a). Vegetation in these areas could be reduced if the water source is diminished (e.g., flow from springs and wells). Additionally, this vegetation could be affected if shallow unconfined groundwater levels are lowered below the plants' rooting depth. It is unknown whether shallow unconfined groundwater occurs in this part of Smoke Creek Desert. Therefore, it is unknown whether groundwater drawdown in this area would adversely affect wetland vegetation.

One flowing spring site that could be subject to groundwater drawdown (<2 feet) is located at the High Rock Ranch just inside the California border (Spring HLV-165; **Figure 4-1**). This spring had a measured flow of 810 gal/min and warm temperature in 1990 (JBR Consultants Group 1990b). Little or no impact to flow is expected at this spring site because it is near the zero drawdown contour line as predicted by the model (**Figure 4-1**), and the spring is assumed to be under substantial pressure.

One spring site (HLV-206) is located between the projected 15- and 20-foot groundwater drawdown contours (**Figure 4-1**), but there was no flow observed in 2004 (Westech 2004a). A small (<0.1 acre) depressional wetland is present at this site which is assumed to be maintained by surface water which probably would not be affected by groundwater drawdown.

TABLE 4-4
Springs and Flowing Wells That Could Be Affected by Groundwater Drawdown From Proposed Action Pumping at Fish Springs Ranch

Spring or Flowing Well Name/Number	Location	Elevation (feet)	Water Source	Site Description
Spring or Flowing Well is Present, Along with Riparian/Wetland Zone				
Located Between 5 and 10 foot Drawdown Contours Predicted by Model for 8,000 af/yr Pumping				
15 Springs or Flowing Wells in Southern Smoke Creek Desert: HLV-168 through HLV-183	Sec. 19 & 20, T28N, R20E; Sec. 1,2,12 & 13, T28N, R19E; Sec. 22, 26 & 27, T29N, R19E. Seven of these sites are on public land.	3870 – 3990	HLV-168: spring 1 gpm; no outflow. HLV-169: well or spring 5 gpm; water in channel. HLV-171: flowing well 50 gpm. HLV-172: flowing well >100 gpm. HLV-173: two flowing wells >100 gpm. HLV-174: flowing well 2 gpm. HLV-175: flowing well >50 gpm. HLV-176: flowing well 5-10 gpm. HLV-177: spring 3-5 gpm. HLV-178: flowing well 1-2 gpm. HLV-179: flowing well/spring >50 gpm. HLV-180: spring <5 gpm. HLV-182: seep-spring. HLV-183: spring <1 gpm.	10 flowing wells and 5 springs in Smoke Creek Desert; most of these have herbaceous wetland totaling <70 acres (Westech 2004a), with some ponds and flowing aquatic habitat; all sites have low to medium habitat quality for TES butterfly species (Sanford 2004a), but no special status butterflies were identified (Sanford 2004b); most well discharges are thermal with temperatures of up to 48° C; flow rates ranged from <1 - 145 gpm in 1990.
Located Between 0 and 5 foot Drawdown Contours Predicted by Model for 8,000 af/yr Pumping				
Spring HLV-165, High Rock Spring	SE,SW¼ Sec. 25, T28N, R17E. Located on public land near private land boundary.	4040	Major spring flowing 810 gpm in 1990, with water temperature of 27°C (JBR Consultants 1990b). Water may be associated with fracture zone that supplies water to this part of Honey Lake Valley.	At High Rock Ranch inside California border; no access by Westech in 2004. Unknown wetland habitat. This spring is located near the zero-drawdown contour line as predicted by the model.
Spring or Well has Ceased Flowing, But Riparian/Wetland Zone is Present				
Located Between 15 and 20 foot Drawdown Contours Predicted by Model for 8,000 af/yr Pumping				
Spring/Seep HLV-206	SW,SE¼ Sec. 17, T26N, R19E. Located on private land.	3980	Depressional wetland; no surface water flow; former spring likely ceased flowing; water source for wetland appears to be groundwater.	Herbaceous depression wetland <0.1 acre; this site has two springs on Exhibit 5 in Westech (2004a) report which likely are just a single site; this site is located in East Alkali Flat survey area as medium quality habitat for TES butterfly (Sanford 2004a).
Located Between 10 and 15 foot Drawdown Contours Predicted by Model for 8,000 af/yr Pumping				
Capped Well HLV-203 Ferrel Playa Well	NW,NW¼ Sec. 30, T26N, R19E. Located on private land.	3980	Minor surface water flow into wetland/pond area; capped flowing well appears to leak some water at ground surface around casing, supporting nearby wetlands.	Pond and herbaceous wetland near capped well and in nearby drainage channel; <10 acres wetland habitat (Westech 2004a); this site is located in South Alkali Flat survey area as medium quality habitat for TES butterfly (Sanford 2004a).
Well HLV-202 (dry), Lime Rock Well	SW,NE¼ Sec. 25, T26N, R18E. Located on private land.	3980	Former well site; no well casing found; small wetland area for which groundwater is likely source; no surface water flow.	Dry well that formerly supplied trough; stopped flowing many years ago; herbaceous wetland <1.0 acre (Westech 2004a); this site is located in South Alkali Flat survey area as medium quality habitat for TES butterfly (Sanford 2004a).

TABLE 4-4 (continued) Springs and Flowing Wells That Could Be Affected by Groundwater Drawdown From Proposed Action Pumping at Fish Springs Ranch				
Spring or Flowing Well Name/Number	**Location**	**Elevation (feet)**	**Water Source**	**Site Description**
Located Between 0 and 5 foot Drawdown Contours Predicted by Model for 8,000 af/yr Pumping				
Flowing Well HLV-201 (dry), Desert Well	NW,NE¼ Sec. 26, T26N, R18E. Located on public land near private land boundary.	3980	Dry well; small wetland area along channel; no surface water flow.	Dry well that formerly supplied water tank; stopped flowing many years ago; herbaceous wetland <0.1 acre (Westech 2004a).

Note:

1. Groundwater drawdown contours obtained from groundwater flow model performed by Lahontan (2004).
2. Locations of springs and flowing wells obtained from Westech (2004a) and JBR Consultants Group (1990a, 1990b).
3. Threatened/endangered species (TES) butterfly (i.e., Carson wandering skipper) habitat information from Sanford (2004a, 2004b).
4. This table only lists springs located at elevations below 4100 feet elevation in eastern Honey Lake Valley and Smoke Creek Desert, above which the springs are assumed to be from local perched groundwater flow systems in mountains that would not be affected by proposed pumping at Fish Springs Ranch.
5. See **Figure 4-1** for locations of springs and flowing wells.
6. Sec. = Section; T = Township; R = Range; gpm = gallons per minute; USGS = U.S. Geological Survey.

Two additional flowing well sites (HLV-202 and HLV-203) are located between the 10- to 15-foot groundwater drawdown contours as predicted by the model (**Figure 4-1**). One additional flowing well (HLV-201) is located between the 0 and 5-foot drawdown contours. Based on field observations by Westech (2004a), however, these wells are no longer flowing. The three sites have the following observed riparian or wetland areas: HLV-201 = <0.1 acre, HLV-202 = <1.0 acre, and HLV-203 = <10 acres (Westech 2004a). The riparian or wetland zones could be adversely affected by the proposed pumping if groundwater is lowered below the rooting depth for riparian plants. Riparian vegetation along a drainage channel at site HLV-201 appears to be maintained by intermittent water in the channel and possibly some subsurface water in channel alluvium. Riparian vegetation at site HLV-202 appears to be maintained by shallow groundwater that could be lowered by proposed groundwater pumping. Riparian vegetation at site HLV-203 appears to be supported by some surface water in Anderson Canyon and from a leaking capped well. This site could be adversely affected if groundwater drawdown substantially lowers the well's water level.

Due to uncertainty associated with groundwater model results and the degree of groundwater connection with springs, flowing wells, and wetland areas (i.e., groundwater that could be lowered due to proposed production well pumping), it is not possible to accurately quantify the magnitude of impact, if any, that could occur over time to these springs and flowing wells. As previously described under "*Groundwater Impacts*", lowering of groundwater levels would occur gradually over a period of 100 years or more. Some wetland

areas associated with these springs and flowing wells could be adversely affected if water sources are reduced (see the "*Vegetation Resources*" section later in this chapter). Fish Springs (HLV-204), Lime Rock Well (HLV-202), and Desert Well (HLV-201) have ceased flowing in about the last 10 to 20 years, likely due, at least in part, to pumping from irrigation wells at Fish Springs Ranch. As described previously under "*Groundwater Impacts*", minor increases in TDS (<100 mg/L) may occur in some areas of southeastern Honey Lake Valley and in the Astor Pass area; these quality impacts could occur at some of the springs and flowing wells discussed in this section.

Surface Water Impacts for Fish Springs Ranch Project

The proposed water transmission pipeline would extend for 38 miles from Fish Springs Ranch wells to a storage tank on a divide between Antelope Valley and Lemmon Valley. Approximately 13 miles of this corridor would be shared with the proposed Intermountain Water Supply pipeline (2 miles in Dry Valley, 6 miles in Bedell Flat, and 5 miles in Antelope Valley). Therefore, approximately 25 miles of the Fish Springs Ranch water transmission pipeline are unique to this Proposed Action.

For the entire 38-mile proposed Fish Springs Ranch water transmission line, approximately 16 miles would be located adjacent to the Tuscarora Gas Pipeline right-of-way. This 16-mile section extends from southeastern Honey Lake Valley through Dry Valley and Bedell Flat. Eight miles of the 16-mile corridor along the Tuscarora Gas Pipeline are shared with the Intermountain Water Supply pipeline corridor.

The proposed water transmission pipeline for Fish Springs Ranch would cross numerous drainage channels (**Figure 3-6**). The pipeline would be buried to depths of about 4 to 6 feet below ground surface, except at some of the larger stream channel crossings where burial depth would increase to prevent potential scour effects. These larger stream channel crossings likely would occur at Fish Springs Creek, Dry Valley Creek, North Fork Dry Valley Creek, and South Fork Dry Valley Creek. Most of the remaining drainages are small ephemeral channels that contain flow only during brief periods of sufficient rainfall and/or snowmelt.

Pipeline construction across some stream channels may occur when there is flow in the channels, which would require mitigation measures to prevent adverse impacts from erosion and sedimentation (see "*Monitoring and Mitigation Measures*" section). Time required to construct the pipeline across each stream channel would be short, followed by immediate reclamation to restore the channel to near pre-disturbance conditions. Based on USGS topographic maps, the following list indicates the number of stream channels that would be crossed by the proposed water transmission pipeline for Fish Springs Ranch (**Figure 3-6**):

- *Honey Lake Valley – Fish Springs Ranch Pipeline (12 miles)*: 19 ephemeral channels + Fish Springs Creek + Anderson Canyon Creek + Rock Springs Canyon Creek; most of these locations are near where channels from the Virginia Mountains meet the edge of Honey Lake Valley floor.

- *Dry Valley – Fish Springs Ranch Pipeline (9 miles)*: 12 ephemeral channels + North

Fork Dry Valley Creek + Dry Valley Creek + South Fork Dry Valley Creek; most of these locations are near the valley floor where only portions of the major creeks have perennial flow. Approximately 2 miles of this pipeline segment are shared with Intermountain Water Supply's proposed pipeline corridor (6 ephemeral channels + South Fork Dry Valley Creek).

- *Bedell Flat – Fish Springs Ranch Pipeline (10 miles):* 14 ephemeral channels; most locations are near the valley floor where perennial flow does not occur. Approximately 6 miles of this pipeline segment are shared with Intermountain Water Supply's proposed pipeline corridor (13 channels).

- *Antelope Valley – Fish Springs Ranch Pipeline (7 miles):* no substantial drainage channel crossings.

No impacts to surface water quality are expected from the proposed Fish Springs Ranch Project, except for the possible impacts described previously under "*Impacts Common to Proposed Actions*" (e.g., accidental releases of hydraulic fluid, fuel, or oil).

<u>Impacts to Water Users</u>

The primary potential impact to water users would be increased depth to groundwater within the zone of influence which could increase pumping lift costs. As shown on **Figures C-3, C-4** and **C-5 (Appendix C)**, this area of groundwater drawdown as predicted by the model would expand over time (about 100 years) and reach a maximum drawdown of over 30 feet near the production wells at Fish Springs Ranch for a total pumping rate of 8,000 af/yr. The primary water use in the Ranch area is for irrigation; these irrigation wells would be replaced with the proposed production wells. Other areas of existing wells that could be affected by up to 15 feet of groundwater drawdown are: (a) Sand Pass area including the portion of Smoke Creek Desert immediately north of the pass; (b) Astor Pass Area including the portion of Pyramid Lake Valley immediately east of the pass; and (c) Dry Valley area in the northeast part of Honey Lake Valley. As described previously under "*Groundwater Impacts*", minor increases in TDS (<100 mg/L) may occur in some areas of southeastern Honey Lake Valley and in the Astor Pass area.

Impacts Unique to Intermountain Water Supply Project

Groundwater would be pumped at 3,000 af/yr from two wells in west-central Dry Valley, and 500 af/yr from one well in the northwest part of Bedell Flat (**Figure 3-1**). Intermountain Water Supply has secured groundwater rights from the Nevada State Engineer for up to 3,000 af/yr from Dry Valley, including an inter-basin transfer of that amount. The Nevada State Engineer approved a water right of 144 af/yr for Intermountain Water Supply in Bedell Flat (Ruling 5429). This ruling, however, is currently under appeal by Intermountain Water Supply.

Groundwater Impacts for Dry Valley

Groundwater Quantity

A MODFLOW® model was completed in 2005 by InterFlow Hydrology (2005) to simulate pumping groundwater from two wells (yet to be completed) at a combined rate of 3,000 af/yr. The two production wells would be located in west-central Dry Valley near existing wells DV-TW-1 and DV-2 (**Figure 3-5**). The model boundary encompasses most of the lower (western) valley floor, encompassing an area of about 17.5 square miles (**Figure 4-2**).

The model contains four layers: Layer 1 is the upper layer of the model, including ground surface, representing about 250 feet of Quaternary-age alluvium; Layer 2 represents a finer-grained portion of basin-fill deposits; Layer 3 represents the deeper coarser-grained basin-fill sediments; and Layer 4 represents bedrock and is a no-flow boundary. Layer 1 groundwater is unconfined, Layer 3 is confined, and Layer 2 can be either unconfined or confined. Hydraulic conductivities used in the model are 4.0 ft/day for Layer 1, 0.25 ft/day for Layer 2, and 1.0 ft/day for Layer 3. Total combined thickness of the uppermost three layers that would be subject to groundwater withdrawal for the Proposed Action is a maximum of 1,150 feet at the state line.

A steady-state model was constructed and calibrated to produce reasonable replications of historic water levels at 10 wells in Dry Valley. Results of this model were used to represent baseline groundwater elevations in the basin. Subsequently, the model was amended to simulate pumping from two wells located in west-central Dry Valley at a combined rate of 3,000 af/yr (Proposed Action).

Hydrologic budgets used by InterFlow Hydrology (2005) in the baseline model and pumping simulation are presented in **Table 4-5**. The model incorporates 1,233 af/yr of groundwater recharge: 494 af/yr to Layer 1 from precipitation in the mountains, 494 af/yr to Layer 3 from geothermal groundwater inflow along the Honey Lake fault zone, and 117 af/yr to Layer 1 from streambed infiltration. Discharge from the model area includes evapotranspiration at a rate of 550 af/yr, with an assumed extinction depth of 30 feet based on existing phreatophytes. Groundwater outflow westward across the state line to Long Valley, California is 399 af/yr, and discharge to lower Dry Valley Creek is 284 af/yr.

According to the California Department of Water Resources (2004), perennial yield for Long Valley is estimated at about 1,300 af/yr, with current groundwater withdrawals totaling about 100 af/yr (70 af/yr for agriculture and 30 af/yr for municipal/industrial uses). Long Valley Creek, most of which flows in California along the state line and ultimately into Honey Lake Valley, has an average annual flow of about 8,000 af/yr in the southern part of the watershed (Rockwell 1990). It is not known how much surface water in Long Valley Creek enters Honey Lake Valley farther to the north. Lassen County (2004) estimated the amount of groundwater that flows in Long Creek Valley alluvium in the narrow part of the valley near where it enters Honey Lake Valley using a seismic refraction study. Results of this study indicate groundwater flow is only about 150 af/yr (Lassen County 2004). This location is also near where Dry Valley joins Long Creek Valley.

Two production wells completed by the Herlong Utilities Cooperative (HUC) southwest of the Sierra Army Depot are in lower Long Valley. These wells produce sufficient water such that up to 3,000 af/yr would eventually be supplied (Herlong Utilities Cooperative 2003). This indicates that the aquifer in lower Long Valley is considerably more productive than farther upstream above the Dry Valley confluence. Because of this condition, it is not likely that pumping wells in Dry Valley would affect groundwater levels in the vicinity of the HUC production wells and the Sierra Army Depot.

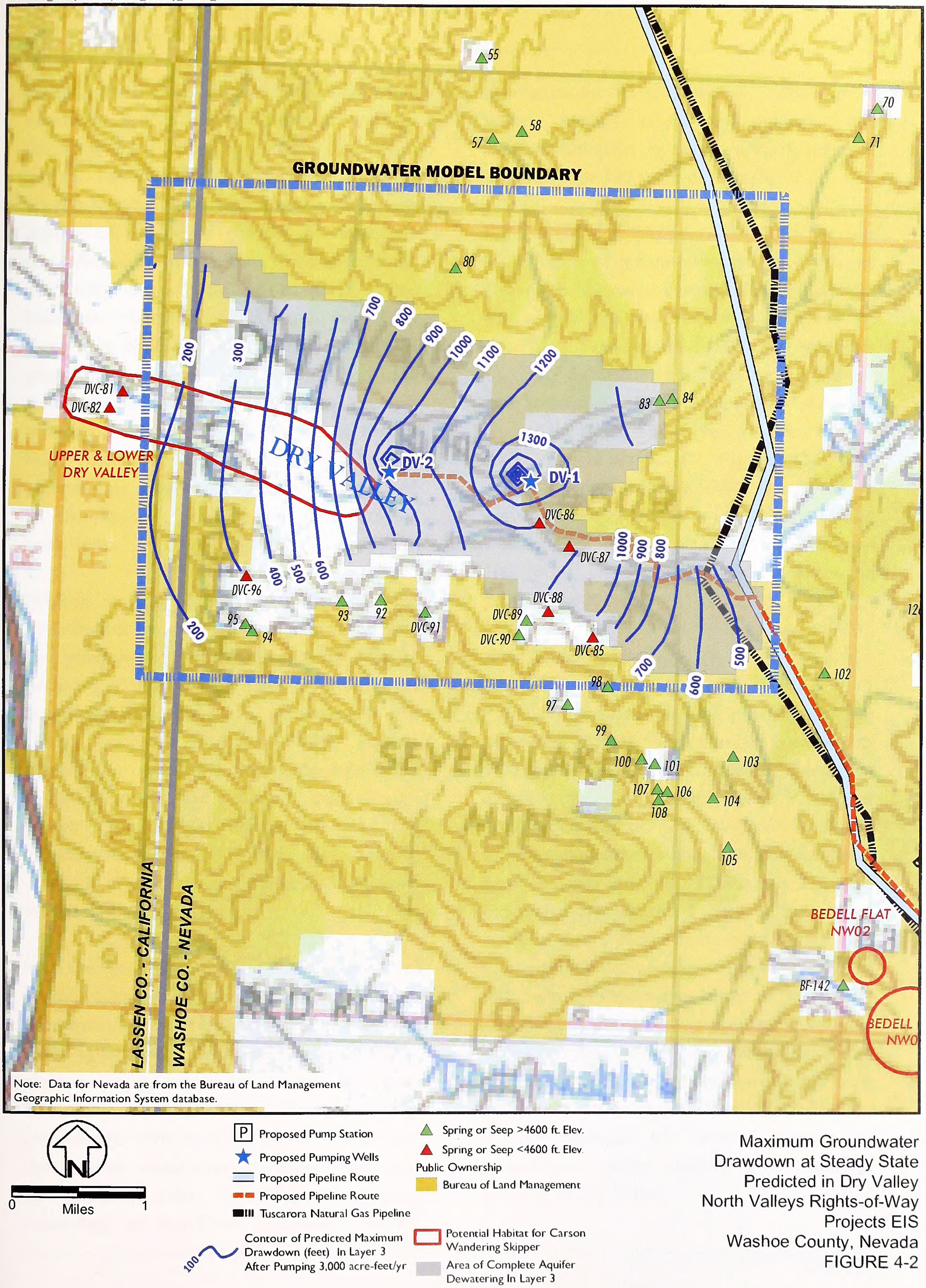
To simulate groundwater conditions that develop under the Proposed Action, pumping from two wells in west-central Dry Valley at a combined rate of 3,000 af/yr is used as the primary groundwater discharge component. Comparing the baseline and pumping condition water budgets in **Table 4-5** indicates that pumping 3,000 af/yr is predicted to eventually completely eliminate evapotranspiration (550 af/yr) and groundwater outflow to Long Valley (399 af/yr) in the model area. In addition, a groundwater flux from Long Valley back into Dry Valley is induced at 1,866 af/yr. These changes would take over 100 years to occur. As previously described, however, there may not be sufficient groundwater in Long Valley to eventually supply nearly 2,000 af/yr to Dry Valley for the proposed pumping of 3,000 af/yr (i.e., Lassen County estimated about 150 af/yr groundwater flow in Long Valley Creek alluvium just upstream of Dry Valley area).

TABLE 4-5
Hydrologic Budget for Groundwater Flow Model at Dry Valley

Recharge and Discharge	Budget Component	Estimated Quantity (acre-feet per year): Baseline Model Conditions	Estimated Quantity (acre-feet per year): Proposed Action Conditions at 3,000 af/yr Pumping (steady-state)
Recharge	Precipitation Recharge to Mountains	622	622
	Groundwater Inflow from Fault Zone	494	494
	Recharge from Upper Valley Stream Bed	47	47
	Recharge from Lower Valley Stream Bed	70	0
	Groundwater Inflow Across State Line	0	1,866
Total Recharge		**1,233**	**3,029**
Discharge	Groundwater Evapotranspiration	550	0
	Groundwater Discharge to Stream	284	0
	Withdrawal from Wells	0	3,000
	Groundwater Outflow Across State Line	399	0
Total Discharge		**1,233**	**3,000**

Source: InterFlow Hydrology 2005. Groundwater model output.

EIS\north_valley\arcmap\draft_eis\dry_bedell_drawdown.mxd



Maximum Groundwater Drawdown at Steady State Predicted in Dry Valley
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 4-2

Pumping from Dry Valley at 3,000 af/yr could eventually reduce any groundwater outflow occurring from upper Dry Valley to Warm Springs Valley (including Winnemucca Valley) via the Walker Lane fault zone. This area is outside of the model domain; however, the groundwater drawdown zone of influence could eventually extend into upper Dry Valley. InterFlow Hydrology (2005) and the USGS (Berger *et al.* 2004) believe that hypothetical groundwater outflow along the Walker Lane fault zone northwest to Honey Lake Valley is not supported by the occurrence of springs along the fault zone. Deep geothermal groundwater inflow to Dry Valley is simulated in the model for baseline and pumping conditions.

Because it is unknown what effect, if any, groundwater pumping in Dry Valley might have on groundwater in Warm Springs Valley (including Winnemucca Valley), no attempt at quantifying impacts is made. According to the USGS (Lopes and Evetts 2004), natural groundwater recharge in Warm Springs Valley is 6,000 af/yr, and current groundwater pumping totals 5,000 af/yr (4,280 af/yr for irrigation/stock uses; 430 af/yr for domestic uses; 190 af/yr for water systems; and 100 af/yr for miscellaneous uses).

For the proposed pumping of 3,000 af/yr, predicted maximum steady-state groundwater drawdown would be over 200 feet at the state line (**Figure 4-2**). Drawdown at the pumping wells eventually would be nearly 1,500 feet. Drawdown is calculated by subtracting groundwater surface elevations developed using the baseline model from elevations developed for pumping under the Proposed Action. According to InterFlow Hydrology (2005), approximately 85 percent of reductions in water levels, subsurface outflow, and evapotranspiration in the pumping center are achieved after 100 years of pumping.

Figure C-6 (Appendix C) presents hydrographs of groundwater drawdown versus time (0 to 100 years) developed using InterFlow Hydrology's 2005 model for two wells near the state line: Well No. 16 (USGS) and Well No. 17 (Lenz domestic well) (see **Figure 3-5** for well locations). Both wells show predicted drawdown of 15 to 25 feet at year 10, and about 220 feet at year 100. **Figures C-7, C-8,** and **C-9 (Appendix C)** show distribution of groundwater drawdown in Layer 3 throughout western Dry Valley in plan view for 1, 10, and 100 years, respectively, after initiation of pumping 3,000 af/yr.

Groundwater Quality

Potential groundwater quality impacts are associated primarily with changes in salinity or TDS resulting from groundwater movement induced by the pumping wells. Water produced from test well DV-TW-1 is slightly geothermal and meets drinking water standards, based on two samples. TDS equals 210 mg/l. No playas are located in Dry Valley and no available data indicate areas of saline or high TDS groundwater are present in the vicinity of this basin. Proposed pumping at 3,000 af/yr would eventually draw groundwater from Long Valley into Dry Valley. No groundwater quality problems are known for this part of the Long Valley area. As a result, there should be little to no potential for adverse impacts to groundwater quality resulting from proposed pumping in Dry Valley.

Impacts to Springs in Dry Valley

Table 4-6 summarizes the springs that potentially could be impacted by proposed pumping in west-central Dry Valley. These features are shown on **Figure 4-2**, along with the model prediction of groundwater drawdown contours. Only those springs located within the groundwater zone of influence as predicted in the model domain, and below an elevation of 4,500 feet amsl are considered for this impact analysis because the regional water table in western Dry Valley has an uppermost elevation of about 4,450 feet amsl (i.e., used for Layers 1 and 2 in model). Two springs (DVC-81 and DVC-82) are located below 4,500 feet amsl in western Dry Valley; these two springs form a pond and wet area that are located on the western side of the state line in California **(Figure 4-2)**.

TABLE 4-6
Springs That Could Be Affected by Groundwater Drawdown From Proposed Action Pumping at Dry Valley

Spring Name/Number	Location	Elevation (feet)	Water Source	Site Description
Spring Present, Along with Riparian/Wetland Zone				
Spring in Dry Valley at Ground Surface Elevation 4500 feet				
DVC-81	SW,NE¼ Sec. 07, T24N, R18E. Located on private land.	4400	Seepage from channel alluvium into pond; no flow out of pond.	Pond along Dry Valley Creek channel bottom; herbaceous wetland <1.0 acre (Westech 2004a); this site is within potential TES butterfly habitat (Sanford 2004a).
DVC-82	SW,NE¼ Sec. 07, T24N, R18E. Located on private land.	4410	Re-emergence of water in channel from upstream water at DVC-81.	Wet area along Dry Valley Creek channel bottom; herbaceous wetland <10 acres (Westech 2004a); this site is within potential TES butterfly habitat (Sanford 2004a).
Spring in Dry Valley at Elevation Between 4500 and 4600 feet				
DVC-86 Duckweed Spring	NW,NE¼ Sec. 15, T24N, R18E. Located on private land.	4530	Small spring flowing 1-2 gpm.	Small dug-out spring at base of hillslope near Dry Valley Creek channel; herbaceous wetland <1.0 acre (Westech 2004a).
DVC-87	SE,NE¼ Sec. 15, T24N, R18E. Located on private land.	4590	Small spring site; no flow during field observation in July 2004.	Small spring site along Dry Valley Creek channel bottom; herbaceous wetland <0.1 acre (Westech 2004a).

Note:

1. Groundwater drawdown contours obtained from groundwater flow model performed by InterFlow Hydrology 2005.
2. Locations of springs obtained from Westech (2004a) and JBR Consultants Group (1990a, 1990b).
3. No threatened/endangered species (TES) butterfly habitat occurs in these spring areas according to Sanford (2004a, 2004b); the "Upper and Lower Dry Valley" areas of Carson wandering skipper habitat generally are saltgrass-greasewood communities that do not include any springs.
4. This table only lists springs located at elevations below 4600 feet elevation along the Dry Valley floor, above which the springs are assumed to be from local perched groundwater flow systems in mountains that would not be affected by proposed pumping in west-central Dry Valley.
5. See **Figure 4-2** for locations of springs.
6. Sec. = Section; T = Township; R = Range; gpm = gallons per minute.

Table 4-6 also includes two springs (DVC-86 and DVC-87) located between 4,500 and 4,600 feet amsl that are farther upstream along the Dry Valley floor (**Figure 4-2**). Both springs have small discharges (<2 gal/min), with DVC-87 having no flow during the July 2004 site visit. Springs located above elevations of 4,500 to 4,600 feet amsl are assumed to be associated with localized groundwater systems in the mountains that are not connected to the regional valley flow system.

Potential impacts to springs include reduced or eliminated flow, changes in water quality, and reduced riparian vegetation if present. The magnitude of impact to a spring, if any, would depend on: (1) whether the source of water would be connected to the aquifer supplying water to the production wells; (2) magnitude of drawdown in relation to the hydraulic head at the spring or well; and (3) location of poorer quality groundwater in proximity to the spring.

The groundwater surface elevation of about 4,500 feet amsl is the most likely elevation that separates the regional groundwater flow system described in Layers 1, 2, and 3 for the model (i.e., basin fill deposits and alluvium) from the localized groundwater flow system in bedrock comprising the surrounding mountains. Other springs located between 4,500 and 4,600 feet amsl in the model area (DVC-85, DVC-88, and DVC-96; **Figure 4-2**) are located along the southern mountain-slope base of Dry Valley. These three springs likely are part of the local groundwater flow system that is recharged and flows in bedrock as part of the Seven Lakes Mountains area and, therefore, would not be affected by proposed pumping in Dry Valley.

Total riparian or wetland area associated with the four springs listed in **Table 4-6** is in the range of 5 to 13 acres (Westech 2004a). Vegetation in these areas could be reduced if flow from the springs is diminished. Additionally, this vegetation could be affected if shallow unconfined groundwater levels are lowered below the plants' rooting depth. Depth to groundwater in some Dry Valley wells is <10 feet below ground surface (**Table 3-3**); therefore, lowering this water table could adversely affect wetland habitat where plant roots extend up to 10 feet.

No known springs exist in the vicinity of where Dry Valley meets Long Valley in California. It is likely that in this area, surface water in Long Valley Creek infiltrates into alluvium where the valley widens. There are springs in northwestern Winnemucca Valley near where it meets Dry Valley. If groundwater drawdown from Dry Valley eventually extends into Winnemucca Valley, flow from some of these springs could be reduced if connected to the regional valley bottom aquifer.

Due to uncertainty associated with groundwater model results and the degree of groundwater connection with springs and wetland areas (i.e., groundwater that could be lowered due to proposed production well pumping), it is not possible to accurately quantify the magnitude of impact, if any, that could occur over time to springs. As previously described under "*Groundwater Impacts for Dry Valley*", lowering of groundwater levels would occur gradually over a period of 100 years or more. Some wetland areas associated with these springs could be adversely affected if water sources are reduced (see the "*Vegetation Resources*" section later in this chapter). As

described previously under "*Groundwater Impacts for Dry Valley*", no adverse impacts to groundwater quality, including springs, are expected due to proposed pumping in Dry Valley.

Impacts to Water Users in Dry Valley

The primary potential impact to water users would be increased depth to groundwater within the zone of influence which could require drilling deeper wells and increased pumping lift costs. In Dry Valley, only one well (Lenz well; **Figure 4-2**) is currently used for domestic and irrigation purposes (Stantec Consulting and Cordilleran Hydrology 2000). This well is located near the center of the valley at the state line and is 100 feet deep. A Nevada water right for about 25 af/yr has been issued for this point of diversion. Model predictions show that the water level in the Lenz well would decline 24 feet after 10 years, and 222 feet after 100 years of pumping from western Dry Valley at 3,000 af/yr (InterFlow Hydrology 2005). The Lenz well, therefore, would become dry after 20 years or more of proposed pumping. A few wells domestic and/or irrigation wells reportedly are located near where Dry Valley joins Long Valley in California. This area could experience some reductions in groundwater levels due to pumping in western Dry Valley. As described previously under "*Groundwater Impacts for Dry Valley*", no adverse effects to groundwater quality are expected from proposed pumping in western Dry Valley.

Groundwater Impacts for Bedell Flat

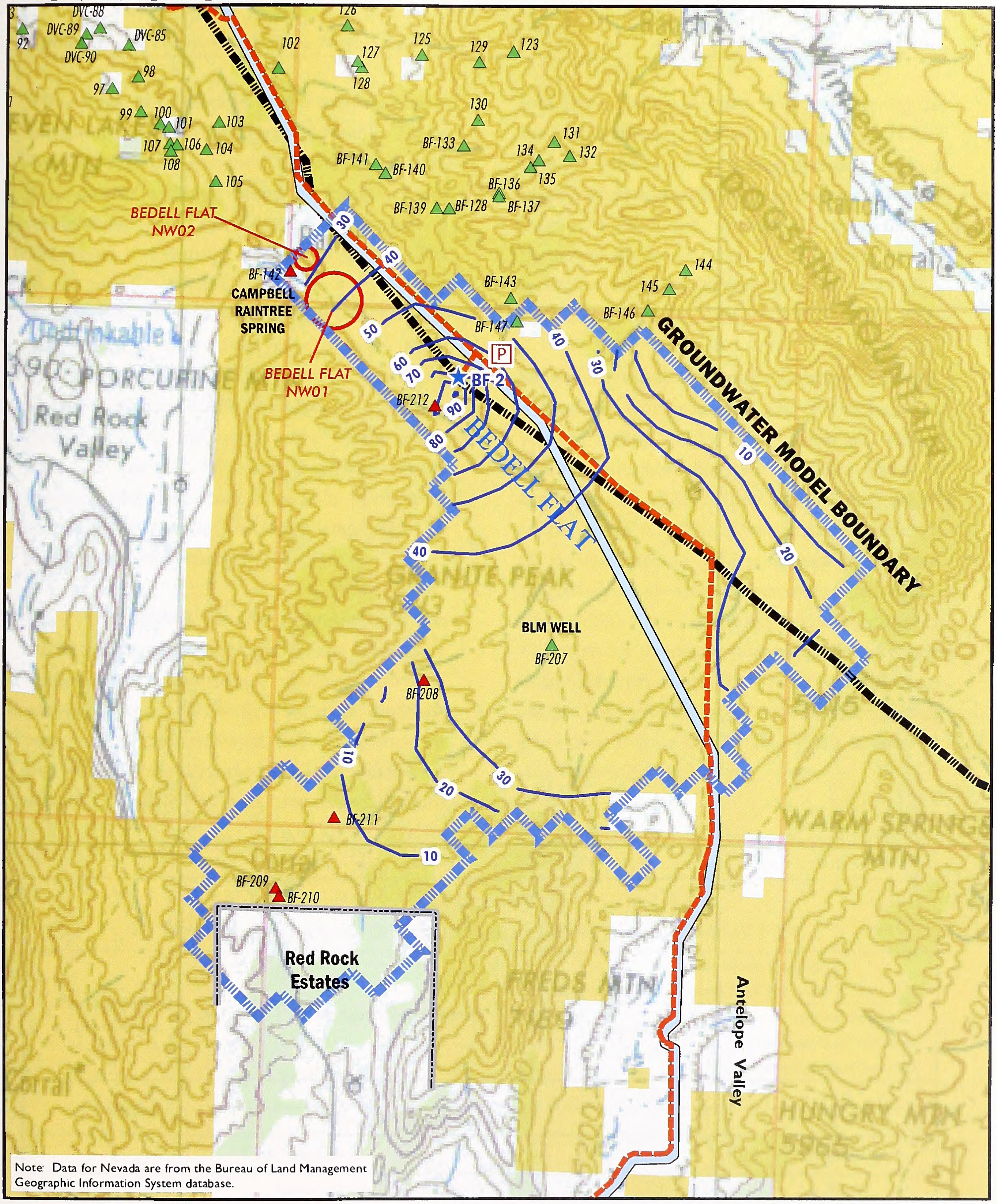
Groundwater Quantity

A MODFLOW® model was completed in 2004 by InterFlow Hydrology (2004b) to simulate pumping groundwater from existing well BF-2 at a rate of 500 af/yr. Well BF-2 is 12 inches in diameter, 400 feet deep, and is located in the northwest potion of Bedell Flat (**Figures 3-5** and **4-3**). The model boundary encompasses most of the Bedell Flat hydrographic area, including the mountain blocks surrounding the valley floor (**Figure 4-3**).

The upper layer (Layer 1) of the model represents the active groundwater flow system comprised primarily of unconsolidated basin fill deposits. Layer 1 also includes fractured volcanic bedrock in the southern part of the model domain and at four locations of subsurface outflow from the basin. The top of Layer 1 represents ground surface, and the bottom of Layer 1 is the surface of low permeable granite bedrock (Layer 2), which is a no-flow boundary. Layer 1 is assigned aquifer properties ranging from confined to unconfined conditions. Hydraulic conductivities for Layer 1 were distributed and refined during model calibration and range from 0.03 to 5.3 ft/day (InterFlow Hydrology 2004b).

A steady-state model was constructed and calibrated to produce reasonable replications of historic water levels at eight wells in Bedell Flat. Results of this model were used to represent baseline groundwater elevations in the basin. Subsequently, the model was amended to simulate pumping well BF-2 located in the northwest side of Bedell Flat at a rate of 500 af/yr (Proposed Action).

EIS\north_valley\arcmap\draft_eis\bedell_drawdown.mxd



N

0 Miles 2

P Proposed Pump Station
Proposed Pipeline Route
Proposed Pipeline Route
Tuscarora Natural Gas Pipeline
Proposed Pumping Wells
Contour of Predicted Maximum Drawdown (feet) In Layer 1 After Pumping 500 acre-feet/yr

Spring or Seep > Valley Fill Aquifer
Spring or Seep < Valley Fill Aquifer
Public Ownership
Bureau of Land Management

Potential Habitat for Carson Wandering Skipper

Maximum Groundwater Drawdown at Steady State Predicted in Bedell Flat
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 4-3

Hydrologic budgets used in the baseline model and pumping simulation are presented in **Table 4-7**. The model assumes 1,300 af/yr of total groundwater recharge based on results of the Maxey-Eakin and chloride-balance estimating techniques previously applied to Bedell Flat (Rush and Glancy 1967; InterFlow Hydrology and Cordilleran Hydrology 2003). Recharge is distributed to the model at the valley floor margins adjacent to the three major mountain blocks that bound the watershed: Dogskin Mountain along the north edge of the basin adds 75 percent of total recharge, Freds Mountain along the south edge adds 14 percent, and Sand Hills along the west edge adds 11 percent of total recharge.

For the baseline model, groundwater is discharged as evapotranspiration and subsurface outflow. Subsurface outflow through unconsolidated fill and fractured bedrock occurs from the northwest side of the basin to Red Rock Valley located at the northwest margin of Bedell Flat near the boundary with Red Rock Valley (**Figure 4-3**). According to the USGS (Lopes and Evetts 2004), there is 900 af/yr of natural groundwater recharge in Red Rock Valley, and current groundwater pumping from this basin totals about 70 af/yr, all for domestic purposes. The groundwater model incorporates groundwater flow of 450 af/yr from Bedell Flat into Red Rock Valley.

Subsurface outflow through fractured bedrock is modeled from the east side of the basin to Warm Springs Valley and Antelope Valley, although modeled flow to Antelope Valley is negligible. The USGS (Lopes and Evetts 2004) report there is 6,000 af/yr of natural recharge to groundwater in Warm Springs Valley, and current groundwater withdrawal totals 5,000 af/yr (4,280 af/yr for irrigation and stock uses; 430 af/yr for domestic purposes; 190 af/yr for water systems; and 100 af/yr for miscellaneous uses). The groundwater model incorporates groundwater flow of 780 af/yr from Bedell Flat into Warm Springs Valley.

TABLE 4-7
Hydrologic Budget for Groundwater Flow Model at Bedell Flat

Recharge and Discharge	Budget Component	Estimated Quantity (acre-feet per year)	
		Baseline Model Conditions	Proposed Action Conditions at 500 af/yr Pumping (steady-state)
Recharge	Precipitation	1,306	1,306
	Groundwater Inflow	0	0
Total Recharge		**1,306**	**1,306**
Discharge	Groundwater Evapotranspiration	73	29
	Groundwater Outflow to Red Rock Valley	450	155
	Groundwater Outflow to Warm Springs Valley	782	621
	Withdrawal from Wells	0	501
Total Discharge		**1,305**	**1,306**

Source: InterFlow Hydrology 2004b. Groundwater model output.

All evapotranspiration in the model occurs in the Campbell Spring area located at the northwest margin of Bedell Flat at the boundary with Red Rock Valley (**Figure 4-3**). Discharge from the spring is included in the evapotranspiration budget in **Table 4-7**. The evapotranspiration rate and extinction depth (50 feet) used in the model produce 73 af/yr of discharge at the Campbell Spring area. Total discharge from the basin is assumed to equal recharge. As a result, under baseline conditions, combined total discharge via groundwater outflow is the remainder of available recharge, or 1,232 af/yr (450 af/yr to Red Rock Valley and 782 af/yr to Warm Springs Valley; **Table 4-7**).

To simulate groundwater conditions that develop under the Proposed Action, pumping of well BF-2 in the northwest side of Bedell Flat at a rate of 500 af/yr is used as a groundwater discharge component, in addition to evapotranspiration and subsurface outflow. The water budgets show that total recharge and discharge rates are similar between the baseline condition and Proposed Action (**Table 4-7**). Comparing the baseline and pumping condition water budgets indicates that pumping 500 af/yr is predicted to reduce evapotranspiration near Campbell Spring from 73 to 29 af/yr.

Total subsurface outflow through the model area is predicted to decrease by 456 af/yr (from 1,232 to 776 af/yr; **Table 4-7**) due to the proposed pumping of 500 af/yr in Bedell Flat. Of this amount, about 300 af/yr of groundwater flow reduction would occur to Red Rock Valley. This is about 67 percent of estimated natural groundwater flow from Bedell Flat to Red Rock Valley, and about 33 percent of natural groundwater recharge to Red Rock Valley estimated by the USGS. The predicted amount of groundwater flow reduction to Warm Springs Valley of about 160 af/yr resulting from proposed pumping in Bedell Flat is about 20 percent of estimated natural groundwater flow to Warm Springs Valley from Bedell Flat, and about 3 percent of natural groundwater recharge to Warm Springs Valley.

For the proposed pumping of 500 af/yr, predicted maximum steady-state groundwater drawdown would be 116 feet in the vicinity of pumping well BF-2, 28 feet at Campbell Spring, 35 feet at the BLM stockwater well located near the valley center, 32 feet at a domestic well at the east margin of the basin, and 9 feet at domestic wells along the southern margin of the basin (**Figure 4-3**). Drawdown is calculated by subtracting groundwater surface elevations developed using the baseline model from elevations developed for pumping under the Proposed Action. According to InterFlow Hydrology (2004b), 65 percent of reductions in water levels, subsurface outflow, and evapotranspiration are achieved after 100 years of pumping.

Figure C-10 (Appendix C) presents hydrographs of groundwater drawdown versus time (0 to 100 years) developed using InterFlow Hydrology's 2004 model for two wells in Bedell Flat -- BLM stockwater well and Etcheverry domestic well No. 16 (see **Figure 3-5** for well locations). The BLM stockwater well shows drawdown of about 0.2 feet in year 1, and 11.7 feet in year 100. Predicted drawdown of 0.01 foot or less occurs at the domestic well in southern Bedell Flat at both 1 and 100 years. **Figures C-11, C-12** and **C-13 (Appendix C)** show the distribution of groundwater

drawdown in Layer 1 throughout Bedell Flat in plan view for 1, 10, and 100 years, respectively, after initiation of pumping 500 af/yr.

Groundwater Quality

Potential groundwater quality impacts are associated primarily with changes in salinity or TDS resulting from groundwater movement induced by the pumping wells. Quality of water from wells BF-1 and BF-2 in Bedell Flat is good with TDS concentrations less than 150 mg/L, sulfate of about 20 mg/L, and low levels of ions and metals. Groundwater quality also is relatively good from domestic wells in the southern part of the valley, with TDS in the range of 170 to 320 mg/L. All of these samples meet drinking water standards. No playas are located in Bedell Flat and no available data indicate areas of saline or high TDS groundwater are present in the vicinity of this basin. As a result, there is little or no potential for adverse impacts to groundwater quality resulting from proposed pumping in Bedell Flat.

Impacts to Springs in Bedell Flat

Table 4-8 lists springs that potentially could be impacted by proposed pumping in Bedell Flat. These features are shown on **Figure 4-3**, along with the model prediction of groundwater drawdown contours. For the southern portion of Bedell Flat, only those springs located within the groundwater zone of influence as predicted in the model domain, and below an elevation of 5,700 feet amsl are considered for this impact analysis because the regional water table in southern Bedell Flat has an uppermost elevation of about 5,680 feet amsl (i.e., used for Layer 1 in model) (InterFlow Hydrology 2004b). For the northern portion of Bedell Flat, only those springs located below an elevation of 5,100 feet amsl are considered for this impact analysis because the regional water table in this area is <5,100 feet amsl (InterFlow Hydrology 2004b). Springs located above an elevation of 5,700 feet in the southern part and 5,100 feet in the northern part of Bedell Flat are assumed to be associated with localized groundwater systems in the mountains that are not connected to the regional valley flow system.

Potential impacts to springs include reduced or eliminated flow, changes in water quality, and reduced riparian vegetation if present. The magnitude of impact to a spring, if any, would depend on: (1) whether the source of water would be connected to the aquifer supplying water to the production wells; (2) magnitude of drawdown in relation to the hydraulic head at the spring or well; and (3) location of poorer quality groundwater in proximity to the spring.

Four springs are present in southern Bedell Flat below an elevation of 5,700 feet amsl, and two springs are in the northern part of Bedell Flat below an elevation of 5,100 feet amsl (**Table 4-8** and **Figure 4-3**). These are the most likely elevations that separate the regional groundwater flow system described in Layer 1 for the model (i.e., basin fill deposits) from localized groundwater flow systems in bedrock comprising the surrounding mountains. Three of the four springs (BF-209, BF-210, and BF-211) in southern Bedell Flat are named springs with low flow and small riparian/wetland areas. The other spring site in southern Bedell Flat (BF-208) that could be affected by proposed pumping was identified by the watering troughs and ponds, but the actual water source could not be located in the field.

TABLE 4-8 Springs That Could Be Affected by Groundwater Drawdown From Proposed Action Pumping at Bedell Flat				
Spring or Well Name/Number	**Location**	**Elevation (feet)**	**Water Source**	**Site Description**
Spring Present, Along with Riparian/Wetland Zone				
Spring in Northern Bedell Flat Below Ground Surface Elevation of 5100 feet				
BF-142 Campbell Spring or Raintree Spring	NW,SW¼ Sec. 31, T24N, R19E. Located on private land.	4820	Spring/seep flowing 5-10 gpm from base of hillside.	Located at Campbell Ranch; extensive wetland area <10 acres (Westech 2004a); this area is potential TES butterfly habitat according to Sanford (2004a).
BF-212 Watering Troughs & Pond	SW,SW¼ Sec. 14, T23N, R19E. Located on public land.	4890	Unknown; source may be distant well or spring that is connected by underground pipe to troughs; flowing 1-2 gpm.	Pipe from a distant well or spring discharges to 3 steel watering troughs and a pond in valley bottom; <0.1 acre wetland habitat at pond (Westech 2004a).
Spring in Southern Bedell Flat Below Ground Surface Elevation of 5700 feet				
BF-208 Watering Troughs & Ponds	SE,NE¼ Sec. 29, T23N, R19E. Located on public land.	5380	Unknown; source may be distant well or spring that is connected by underground pipe to troughs and ponds; flowing 5 gpm.	Pipe from distant well or spring discharges to 2 watering troughs and 2 ponds; herbaceous wetland <0.1 acre (Westech 2004a).
BF-209 Bird Spring	NW,SW¼ Sec. 6, T22N, R19E. Located on public land.	5690	Small spring site; only standing water observed during field observation in July 2004.	Small spring site along drainage swale; herbaceous wetland <1.0 acre (Westech 2004a).
BF-210 Juniper Spring	NE,SW¼ Sec. 6, T22N, R19E. Located on public land.	5590	Underground pipe from spring discharging <1 gpm to watering trough; no flow observed at spring site.	Small spring site along drainage swale; herbaceous wetland <0.1 acre (Westech 2004a).
BF-211 Whitney Spring	SE,SE¼ Sec. 31, T23N, R19E. Located on public land.	5450	Underground pipe from spring discharging <1 gpm to watering trough.	Small spring site along drainage swale; herbaceous wetland <1.0 acre (Westech 2004a).

Note:

1. Groundwater drawdown contours obtained from groundwater flow model performed by InterFlow Hydrology 2004b.
2. Locations of springs obtained from Westech (2004a) and JBR Consultants Group (1990a, 1990b); threatened/endangered species (TES) butterfly (i.e., Carson wandering skipper) habitat information from Sanford (2004a, 2004b).
3. This table only lists springs located at elevations below 5100 feet elevation in northern Bedell Flat and 5700 feet in southern Bedell Flat, above which the springs are assumed to be from local perched groundwater flow systems in mountains that would not be affected by proposed pumping in northwestern Bedell Flat.
4. See **Figure 4-3** for locations of springs.
5. Sec. = Section; T = Township; R = Range; gpm = gallons per minute.

One of the two springs listed in **Table 4-8** for northern Bedell Flat (BF-142; Campbell or Raintree Spring) is located in the Campbell Ranch area. This spring area has a relatively large (<10 acres) wetland habitat. The other spring (BF-212) identified in northern Bedell Flat that could be affected by proposed pumping was identified by watering troughs and a pond, but the actual water source could not be located in the field. The magnitude of impact to these springs in Bedell Flat, if any, would depend on the source's connection with the aquifer subject to production well pumping. InterFlow Hydrology's (2004b) model predicts that the groundwater level at Campbell/Raintree Spring would eventually decline by about 20 feet due to pumping 500 af/yr at well BF-2.

Any springs in Warm Springs Valley and Red Rock Valley that are located near Bedell Flat could experience flow reductions if they are connected to the regional valley bottom aquifer. This would only occur if groundwater flow from Bedell Flat to these adjacent valleys is reduced.

Due to uncertainty associated with groundwater model results and the degree of groundwater connection with springs and wetland areas (i.e., groundwater that could be lowered due to proposed production well pumping), it is not possible to accurately quantify the magnitude of impact, if any, that could occur over time to these springs. As previously described under "*Groundwater Impacts for Bedell Flat*", lowering of groundwater levels would occur gradually over a period of 100 years or more. Some wetland areas associated with these springs could be adversely affected if water sources are reduced (see the "*Vegetation Resources*" section later in this chapter). As described previously under "*Groundwater Impacts for Bedell Flat*", no adverse impacts to groundwater quality, including springs, are expected due to proposed pumping in Bedell Flat.

Impacts to Water Users in Bedell Flat

The primary potential impact to water users would be increased depth to groundwater within the zone of influence which could require drilling deeper wells and increased pumping lift costs. In Bedell Flat, approximately 35 domestic wells and a few non-domestic wells have been completed in the southern part of the basin as part of the Red Rock Estates subdivision (**Figure 3-5**). These wells generally are completed in fractured bedrock (InterFlow Hydrology and Cordilleran Hydrology 2003). Model predictions show that water levels in these wells could eventually decline by about 9 feet over a period of 100 years or more (InterFlow Hydrology 2004b). These wells generally are over 200 feet deep with at least 100 feet of water column in the well (**Table 3-3**). The impact to these wells in southern Bedell Flat from lowered groundwater levels associated with proposed pumping in northwestern Bedell Flat, therefore, is considered minor.

Five additional domestic wells have been identified in the northwest part of Bedell Flat (**Figure 3-5**). These wells are located in the Sand Hills and have water level elevations of about 5500 feet amsl. Therefore, wells in this area likely intercept local groundwater systems associated with bedrock in the mountains that would not be affected by pumping in valley fill deposits of Bedell Flat.

The BLM stockwater well located in the central part of Bedell Flat (**Figure 3-5**) is predicted to have up to approximately 35 feet of drawdown due to proposed pumping in northwestern Bedell Flat. This well is 224 feet deep with a depth to water of about 180 feet (**Table 3-3**). This BLM well, therefore, may eventually need to be deepened due to the lowered groundwater level; however, this would likely not be required until 100 years or more after initiation of pumping proposed by Intermountain Water Supply.

Private domestic and/or irrigation wells located in Warm Springs Valley and Red Rock Valley near Bedell Flat could experience lowered groundwater levels from proposed pumping in Bedell Flat. This would occur only if the wells are completed in the regional valley bottom aquifer, and if there is a reduction in groundwater flow from Bedell Flat to these adjacent basins.

As described previously under "*Groundwater Impacts for Bedell Flat*", no adverse effects to groundwater quality are expected from proposed pumping in northwestern Bedell Flat.

Surface Water Impacts for Dry Valley and Bedell Flat

The proposed water transmission pipeline would extend for 24 miles from the Dry Valley wells to the Bedell Flat well, and then to the pipeline terminus in Lemmon Valley. Approximately 13 miles of this corridor would be shared with the proposed Fish Springs Ranch pipeline (2 miles in Dry Valley, 6 miles in Bedell Flat, and 5 miles in Antelope Valley). Therefore, approximately 11 miles of the Intermountain Water Supply water transmission pipeline are unique to this Proposed Action.

For the entire 24-mile proposed Intermountain Water Supply water transmission line, approximately 8 miles would be located adjacent to the Tuscarora Gas Pipeline right-of-way. This 8-mile section extends from central Dry Valley through northwestern Bedell Flat. This entire 8-mile corridor along the Tuscarora Gas Pipeline is shared with the Fish Springs Ranch pipeline corridor.

The proposed water transmission pipeline for Intermountain Water Supply would cross numerous drainage channels (**Figure 3-6**). The pipeline would be buried to depths of about 4 to 6 feet below ground surface, except at some of the larger stream channel crossings where burial depth would increase to prevent potential scour effects. These larger stream channel crossings likely would occur at Dry Valley Creek, North Fork Dry Valley Creek, and South Fork Dry Valley Creek. Most of the remaining drainages are small ephemeral channels that contain flow only during brief periods of sufficient rainfall and/or snowmelt.

Pipeline construction across some stream channels may occur when there is flow in the channels, which would require mitigation measures to prevent adverse impacts from erosion and sedimentation (see "*Monitoring and Mitigation Measures*" section). Time required to construct the pipeline across each stream channel would be short, followed by immediate reclamation to restore the channel to near pre-disturbance conditions. Based on USGS topographic maps, the following list indicates the number of stream channels that would be crossed by the proposed water transmission

pipeline for Intermountain Water Supply (**Figure 3-6**):

- *Dry Valley – Intermountain Pipeline (5 miles)*: 12 ephemeral channels + North Fork Dry Valley Creek + Dry Valley Creek + South Fork Dry Valley Creek; most of these locations are near the valley floor where only portions of the major creeks have perennial flow. Approximately 2 miles of this pipeline segment are shared with Fish Spring Ranch's proposed pipeline corridor (6 ephemeral channels + South Fork Dry Valley Creek).

- *Bedell Flat – Intermountain Pipeline (11 miles)*: 14 ephemeral channels; most locations are near the valley floor where perennial flow does not occur. Approximately 6 miles of this pipeline segment are shared with Fish Spring Ranch's proposed pipeline corridor (13 ephemeral channels).

- *Antelope Valley – Intermountain Pipeline (5 miles)*: No substantial drainage channel crossings. Approximately 5 miles of this pipeline segment are shared with Fish Spring Ranch's proposed pipeline corridor.

- *Lemmon Valley – Intermountain Pipeline (3 miles)*: 8 ephemeral channels.

Groundwater drawdown in Dry Valley resulting from pumping 3,000 af/yr would extend into Long Valley of California. In the vicinity of where Dry Valley joins Long Valley, it is likely that Long Valley Creek loses flow naturally to underlying groundwater in alluvial deposits because the valley becomes wider and flatter in this area. In this case, pumping in Dry Valley would not likely affect flow in Long Valley Creek. If there is any perennial stream flow in Warms Springs Valley (including Winnemucca Valley) and Red Rock Valley in proximity to Dry Valley or Bedell Flat, decreasing stream flow could occur as a result of pumping in Dry Valley and Bedell Flat. This would occur only if there is a decrease in groundwater flow to these basins surrounding Dry Valley and Bedell Flat.

No impacts to surface water quality are expected from the proposed Intermountain Water Supply project, except for the possible impacts described previously under "*Impacts Common to Proposed Actions*" (e.g., accidental releases of hydraulic fluid, fuel, or oil).

ALTERNATIVE A – CONSTRUCT PIPELINES WITHIN COMMON RIGHT-OF-WAY

Disturbed areas associated with water transmission pipeline crossing of drainage channels (i.e., non-wetland waters of the U.S.) would be reduced slightly for Alternative A. Potential impacts to groundwater resources from drawdown due to production well pumping would be similar to effects described for "*Impacts Common to Proposed Actions*", "*Impacts Unique to Fish Springs Ranch Project*", and "*Impacts Unique to Intermountain Water Supply Project*".

NO ACTION ALTERNATIVE

No Action for Fish Springs Ranch Project

Under the No Action Alternative, Fish Springs Ranch could pump groundwater for beneficial uses approved by the State Engineer, up to the

amount of water provided in their existing water rights. Water use could include continuation of seasonal irrigation at Fish Springs Ranch. Pumping of groundwater could cause lowering of groundwater levels and/or reduced flow in springs and flowing wells, which could affect some associated wetlands. The magnitude of effect from continued pumping, however, is difficult to predict because of uncertainty regarding connection between groundwater drawdown and source water to springs, flowing wells, and wetlands.

Withdrawal of groundwater for irrigation occurs seasonally which allows for some groundwater recovery during periods of non-pumping. Groundwater extraction of about 4,000 af/yr for irrigation purposes from five wells at Fish Springs Ranch over the last 10 years may have contributed to elimination and reduction of flow from some springs and flowing wells, and also may have eliminated or reduced some wetland areas.

Construction-related impacts for the water transmission pipelines (i.e., short-term disturbance of drainage channels) would not occur under the No Action Alternative. All other water-related impacts described previously for the action alternatives would not occur under the No Action Alternative.

No Action for Intermountain Water Supply Project

Under the No Action Alternative, Intermountain Water Supply could pump groundwater for beneficial uses approved by the State Engineer, up to the amount of water provided in their existing water rights. No specific uses for water other than those described in the Proposed Action for Intermountain Water Supply have been identified. Surface occupancy to allow development of two of the proposed wells included in Intermountain Water Supply's Proposed Action would require issuance of a right-of-way from BLM.

Selection of the No Action Alternative for the Intermountain Water Supply project would eliminate projected impacts to water resources associated with this Proposed Action. To the extent that Intermountain Water Supply could proceed with groundwater withdrawal to exercise their existing water rights from well locations on private land, some springs and associated wetlands could be impacted.

MONITORING AND MITIGATION MEASURES

Measures Common to Proposed Actions

Stream channel crossings would be constructed in accordance with State Stream Alteration Permits, U.S. Army Corps of Engineer requirements, and land management agencies. Crossings would be constructed during low-flow conditions, where possible, and as close to perpendicular to the axis of the channel as engineering and routing conditions permit. In some instances, banks of the channel may be excavated to allow equipment access to the channel bottom. Soil would be stockpiled approximately 10 feet from the top of channel banks, but within the right-of-way. Equipment operation in the stream channel would be limited to that needed to construct the crossing, and is not expected to require more than two days per crossing.

Where flowing water is encountered during construction, sediment barriers (such as silt fences) would be installed after initial disturbance of the stream channel or adjacent upland. Silt fences would be staggered downstream of the crossing on both banks to capture sediment discharged into the stream during trenching and backfill. Sediment barriers would be properly maintained throughout construction and reinstalled as necessary (such as after backfilling the trench) until restoration of the right-of-way has been completed. After the pipe is installed, stockpiled growth media would be used to restore banks of the channel to a stable configuration as close to preconstruction contours as possible.

The following measures would be implemented where the proposed water transmission pipeline crosses streams, wetlands, or riparian areas:

- Construction in streams and wetlands would be expedited to minimize the duration of turbidity-causing activities.
- Selecting an alignment that minimizes stream crossings.
- Scheduling construction of stream crossings during periods of low or no flow.
- Implementing temporary erosion and sediment control practices.
- Restoring stream banks and wetlands to original configuration as soon as possible.
- Stabilizing stream banks and adjacent areas with permanent erosion control and vegetation as soon as possible.
- Periodic inspection of the right-of-way during and after construction to identify and perform maintenance activities.

Chemicals, fuels, and lubricants would not be stored within 300 feet of a stream crossing. Gasoline, oil, and lubricants would be transported in approved containers in accordance with National Fire protection Association Code. Sorbant material would be maintained on-site to absorb spills of petroleum products that may occur during construction activities.

Selected wells and springs in each of the three basins (eastern Honey Lake Valley, western Dry Valley, and Bedell Flat) could be monitored to determine if the proposed pumping wells are creating significant impacts to any private/public wells and/or springs. Monitoring would consist of periodic water level measurements in selected wells distributed in the basins, measurements of flow from springs and flowing wells, and/or extent of wetland habitat associated with springs and flowing wells. One or more of the following mitigation measures could be implemented if adverse impacts occur to groundwater levels in wells or flow from springs/wells:

- Replace or deepen impacted well, if usable water is available deeper in the aquifer or in another aquifer.
- Reduce pumping rate in production well(s) or pump intermittently to allow for periodic recovery of groundwater levels; if possible, this should be initiated prior to adverse impacts occurring at springs or private wells.

- Add more production well(s) that would each pump at lower rates to distribute groundwater drawdown over a larger area and, thus, reduce the magnitude of drawdown surrounding each individual well.

- Purchase other existing water rights, if available, in the affected area.

- Construct water-enhancement structures at spring or flowing well sites where flow rate reductions can be attributed to groundwater drawdown caused by production well pumping. Additional water can be provided by constructing guzzlers and/or wells that extend deeper into the aquifer.

A water monitoring plan should be developed in consultation with the Nevada State Engineer, Washoe County, Lassen County, and California Department of Water Resources. This plan could include threshold levels by which one or more mitigation measures would be implemented. Mitigation would be the responsibility of the pumping well owner or operator whose well is causing the adverse effect.

Measures Unique to Fish Springs Ranch Project

Washoe County Utility Division completed 26 wells in the vicinity of Fish Springs Ranch in 1989-1990 as part of the previously proposed Truckee Meadows Project. These wells include monitoring wells used to measure water levels during extended aquifer testing of Fish Springs Ranch irrigation wells, as well as exploratory and observation wells in the Sand Pass and Astor Pass areas to investigate potential inter-basin groundwater flow with Honey Lake Valley. Washoe County monitored many of the wells monthly through spring 1991. Monitoring frequency diminished to annual measurements by spring 1999 when the program was terminated.

On March 8, 2003, Fish Springs Ranch again began measuring water levels in 13 Washoe County wells. Each well has been equipped with automatic recorders to collect measurements hourly. Water elevation data are retrieved quarterly and hydrographs generated to supplement data previously obtained by Washoe County. This water level monitoring could continue for several years after increasing total pumping rate to 8,000 af/yr to determine if the magnitude and extent of groundwater drawdown areas are similar to model predictions.

Due to potential changes in groundwater quality in the groundwater drawdown area (i.e., movement of high saline water from playa areas to zones of better groundwater quality), groundwater samples could be collected periodically from selected wells to determine if any significant water quality changes develop after initiation of production well pumping at 8,000 af/yr.

Measures Unique to Intermountain Water Supply Project

Of particular concern for the Dry Valley project is the amount of groundwater drawdown that would develop at the state line after initiation of production well pumping at 3,000 af/yr. Therefore, a reduced pumping rate is the most likely mitigation measure to initially implement for Dry Valley. Water levels in existing wells in this area should be measured periodically to determine if the magnitude and extent of groundwater drawdown are significant.

For Bedell Flat, impacts to groundwater levels in private domestic wells located at the subdivision in southern Bedell Flat should be evaluated after initiation of production well pumping at 500 af/yr. This can be accomplished by measuring water levels periodically at selected wells within the subdivision and/or between the subdivision and production well.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Common to Proposed Actions

Loss or reduction in flow from springs/wells and associated wetlands would be for the duration of the Projects, but if groundwater pumping were stopped, flows from springs/wells and associated wetland habitat could eventually recover to approximate pre-project levels. This recovery period is unknown, but likely would be many years depending on the total period of pumping, extent of wetland habitat loss, and whether recovery occurs naturally or is assisted through a revegetation program.

RESIDUAL EFFECTS

Effects Common to Proposed Actions

Residual effects would remain where lowered groundwater levels and/or reduced flow from springs/wells caused by production well pumping would have a permanent effect on groundwater availability in the basins.

SOIL RESOURCES

SUMMARY

The Fish Springs Ranch Proposed Action would result in approximately 395 acres of surface disturbance from installation of about 38 miles of water transmission pipelines, wells, pump station, storage tanks, and an electrical substation. The Intermountain Water Supply Proposed Action would involve about 225 acres of surface disturbance from installation of 24 miles of water transmission pipelines, wells, pump station, and storage tanks.

Portions of the pipeline routes included in the Proposed Actions would occur adjacent to previously reclaimed land associated with the Tuscarora Natural Gas Pipeline. Potential impacts to soil resources include modification to chemical and physical characteristics. These impacts are expected to be minimized, to the extent possible,

following reclamation. Loss of soil and short-term interruption of natural soil processes and functions would be reversed by natural soil development over time.

DIRECT AND INDIRECT IMPACTS

Proposed Actions

Impacts Common to Proposed Actions

Impacts on soil resources occur in two separate stages: during and after pipeline installation operations. Short-term impacts resulting from initial pipeline construction activities include increased soil compaction and destruction of soil structure. Additional potentially longer term impacts could result from mixing of surface and subsurface soil horizons and wind and water erosion. Although visual impacts to soil are greater during construction activities, topsoil erosion during and after topsoil redistribution has a greater effect on reclamation success.

Chemical changes would also result from mixing surface soil with subsoil during salvage activities. Mixing surface and subsurface soil types can effectively dilute organic matter and nutrient content of the surface soil. Mixing of surface and subsurface soil types can also result in increases in clay content, pH, and salt content of surface soil. Such impacts to the soil resource could result in reduced productivity and cause difficulty in revegetating some soil types.

Impacts on physical characteristics of soil during salvage, stockpiling, and redistribution would include compaction, and destruction of soil structure as a result of soil handling and surface traffic. These impacts could impede root growth and result in decreased infiltration rates and permeability. Decreased infiltration rates and permeability would result in increased surface runoff and potentially more erosion from impacted sites. If conducted to adequate depth and spacing, ripping will eliminate the majority of subsoil compaction.

Short-term surface soil loss by wind erosion associated with the Proposed Actions would be greater than normal until vegetation is reestablished. Potential for loss of subsoil would be greatest between initial disturbance and redistribution of cover soil. The volume of soil loss due to wind erosion depends on wind velocity, size of disturbance area, condition of exposed area, and soil texture. Water erosion potential is influenced by the extent of disturbance, surface soil texture, soil cover, and steepness of slope and could be significant during heavy precipitation events.

Due to the relatively short construction period and prompt replacement of salvaged soils, reduction in soil biological activity is expected to be short-term. After soil redistribution, biological activity would increase and eventually reach pre-salvage levels.

Greatest risks for long term soil impacts include soil loss from wind and water erosion and decline in productivity as a result of mixing and compaction. This potential for continued soil loss occurs until vegetation is reestablished. Productivity levels may be reduced for several years where compaction is not mitigated or where topsoil is mixed with comparatively

unsuitable (e.g., high clay content, saline, or high coarse fragment) subsoil types.

Impacts Unique to Fish Springs Ranch Project

Approximately 395 acres would be disturbed as a result of the proposed Fish Springs Ranch project. Soil types encountered at the north end of the Projects Area include those formed from lacustrine deposits on alkali flats of Honey Lake Valley. These soil types occur extensively in the Dedmount-Umberland Association along the proposed pipeline corridor and exhibit high alkalinity, shallow development, and relatively inhospitable plant growth characteristics relative to other soil types. This soil type could prove difficult to revegetate.

Impacts Unique to Intermountain Water Supply Project

Approximately 225 acres would be disturbed as a result of the proposed Intermountain Water Supply project. Soil salvage and replacement was proposed for the entire Project, although depths are unspecified. Soil should be salvaged at depths that ensure the most suitable growth material is removed and kept separate from less suitable underlying material. The depth of salvage should be variable to allow for greater salvage depths in deeper, more productive soil types, and less salvage in soil types with shallow bedrock or relatively unsuitable subsurface soil types.

ALTERNATIVE A – CONSTRUCT PIPELINES WITHIN COMMON RIGHT-OF-WAY

Impacts resulting from implementation of Alternative A would be similar to those described for the Proposed Actions except that 28 fewer acres that require reclamation would be disturbed. Reduction in surface disturbance would reduce the amount of soil loss from erosion and handling and further limit other impacts to the soil resource. However, the types of impacts would be comparable to the Proposed Actions and no specific soil types would be avoided with this alternative.

NO ACTION ALTERNATIVE

Common to Proposed Actions

The No Action Alternative would eliminate potential impacts of the Proposed Actions on soil resources.

MONITORING AND MITIGATION MEASURES

Measures Common to Proposed Actions

Soil in the area varies in ability to support revegetation. On some soil, vegetation is relatively easy to establish and maintain, the surface is stable and resists erosion, and reconstructed soil has good potential productivity. Other soil types can be vegetated and stabilized by modifying one or more properties. Topdressing with better material or application of soil amendments may be necessary for satisfactory performance. Top

dressing with better material is often necessary to establish and maintain vegetation.

Management practices, such as minimizing the time soil is exposed, mulching of steeper slopes, and appropriate silt fence placement would reduce losses.

Measures Unique to Fish Springs Ranch Project

Prior to reclamation, the Soil Survey should be referenced to determine the appropriate depth of growth media to salvage prior to trenching activities. Fish Springs Ranch has proposed a minimum of 3 inches of topsoil to a maximum depth of 12 inches would be salvaged. Most soil in this area has an A horizon of six inches or greater. The depth of this growth media should be maximized to assist in successful reclamation due in part to the generally low water holding capacity, fertility combined with the arid environment. Where possible, topsoil salvage should be no less than six inches.

The Dedmount Series encountered near the north end of the Fish Springs Ranch proposed pipeline route consists of saline smectitic clays. Care should be taken in this area to salvage only the upper organic horizon to avoid using the saline clay subsoil as a potential growth media.

Measures Unique to Intermountain Water Supply Project

No specific mitigation or monitoring measures have been identified beyond those described under "*Measures Common to Proposed Actions*" above.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Common to Proposed Actions

Soil loss as a result of natural or man-caused forces would be irreversible and irretrievable.

RESIDUAL EFFECTS

Effects Common to Proposed Actions

Short-term loss and interruption of natural soil processes and functions (e.g., soil development, infiltration, percolation, water holding capacity, structure, and organic matter) can be reversed by natural soil development over an unknown period of time. Appropriate reclamation efforts expedite those natural soil development processes. Loss of vegetation productivity as a result of soil impacts and land uses could be reversed within about 5 years after successful reclamation.

VEGETATION RESOURCES

SUMMARY

The Fish Springs Ranch and Intermountain Water Supply Projects would have short-term direct effects to sagebrush, grassland, and juniper woodland communities during construction of the respective water transmission pipelines. Concurrent reclamation would establish grasses and forbs on disturbed pipeline rights-of-way, but would likely take 10 or more years to re-establish sagebrush and juniper communities.

Construction of water transmission pipelines would result in temporary disturbance of approximately 395 acres vegetation for the Fish Springs Ranch Project and 225 acres for the Intermountain Water Supply Project. Vegetation communities would be permanently removed during construction of wellheads, pumping stations, storage and surge tanks, and an electrical substation. Disturbance of existing vegetation would increase potential for noxious weeds and other invasive species to proliferate and spread to adjacent undisturbed areas.

No sensitive species or plants listed under the Endangered Species Act would be affected by the proposed Projects. Cacti protected under Nevada law would be salvaged and replanted in undisturbed habitats.

Based on results of groundwater modeling, some wetland plant communities could be reduced or eliminated as a result of lowered groundwater levels and/or reduced flow from springs and flowing wells resulting from groundwater drawdown created by pumping wells in eastern Honey Lake Valley, western Dry Valley, and northwestern Bedell Flat. Lowering groundwater levels due to pumping could also cause ground subsidence within the zone of influence in areas of unconsolidated sediment.

Approximately 70 non-wetland drainages would be crossed by the proposed water transmission pipelines. Assuming a construction width of 50 feet and length of 10 feet for each drainage crossing, less than 1.0 acre of non-wetlands waters of the U.S. would be affected by construction of the proposed pipelines. Short-term disturbance to the channels bed and bank would occur during construction activities.

Some jurisdictional and non-jurisdictional (isolated) wetland areas within the groundwater drawdown zone of influence could be reduced or eliminated as a result of lowered groundwater levels and/or reduced flow from springs. The magnitude of impact, if any, is difficult to quantify because of uncertainty determining water source for each spring and wetland area.

DIRECT AND INDIRECT IMPACTS

Impacts Common to Proposed Actions

The Proposed Actions would have short-term direct affects to sagebrush, grassland, and juniper woodland communities during construction of the respective water transmission pipelines. Upland vegetation communities would be permanently removed during construction of wellheads, pumping stations, storage and surge tanks, and an electrical substation.

Riparian and wetland vegetation generally associated with ephemeral and intermittent drainages would also be removed during construction of the proposed pipelines. Approximately 70 non-wetland ephemeral or intermittent drainages would be crossed by water transmission pipelines. Assuming a construction width of 50 feet and length of 10 feet for each drainage crossing, less than 1.0 acre of non-wetlands waters of the U.S. would be affected by construction of the proposed pipelines.

Reclamation immediately following construction would re-establish vegetation on areas disturbed by pipeline construction within 3 to 5 years. Reclamation would reestablish self-sustaining vegetation on areas of the buried pipeline systems disturbed by construction; however, reestablished vegetation would differ in composition and diversity for several years from vegetation that existed prior to construction. On areas where sagebrush or junipers are removed, re-establishment of these communities could take 10 or more years. Typically sagebrush has been difficult to establish on pipeline rights-of-way in the Projects Area (i.e., Tuscarora Pipeline). Over the short-term (3 to 5 years), grasses and forbs would likely dominate the vegetation on reclaimed areas along the buried pipeline corridors.

Disturbed sites and recently seeded areas would be susceptible to invasion by undesirable species such as noxious weeds and cheatgrass. Noxious weed invasion would hinder establishment of desirable vegetation including native species. Dust from roads and construction activities coating vegetation in areas adjacent to or downwind from dust sources may predispose some species to insect infestation.

Based on results of groundwater modeling (see "*Water Resources*" section in this chapter), some wetland plant communities could be reduced or eliminated as a result of lowered groundwater levels and/or reduced flow from springs and flowing wells resulting from groundwater drawdown created by pumping wells in eastern Honey Lake Valley (8,000 af/yr), western Dry Valley (3,000 af/yr), and northwestern Bedell Flat (500 af/yr). The magnitude of impact, if any, to wetland areas is difficult to quantify because of uncertainty regarding connection of wetland source water to groundwater in the aquifers that would be subject to dewatering by production wells.

Lowering groundwater levels due to pumping could also cause ground subsidence within the zone of influence (see "*Water Resources*" section in this chapter) in areas of unconsolidated sediment. Ground subsidence could affect subsurface discharge paths of water

from springs and affect surface topography of wetlands. If subsidence were to occur, drainage patterns to and from wetlands could be altered. Consequently, affected wetlands could increase or decrease in size depending on site-specific topographic and hydrological features affected.

No BLM-sensitive species or species listed as threatened or endangered under the Endangered Species Act (e.g., Steamboat buckwheat) would be affected by the Proposed Projects. One species, however, of concern to the state of Nevada (Rams Horn Spring milkvetch), growing on private and public land at Bedell Flat and Antelope Valley, could be affected by pipeline construction. It is unlikely that loss of a few individuals would affect the viability of local or regional populations. However, studies of distribution and population locations of Rams Horn Spring milkvetch have not been conducted over much of Nevada. Populations of cactus protected under Nevada law would likely be removed. Impacts to cactus would be mitigated by conducting searches for cacti of areas to be disturbed, then salvaged and replanted.

Indirect effects of the Proposed Actions would include potential movement of weedy species from reclaimed areas to adjacent stands of native vegetation.

Impacts Unique to Fish Springs Ranch Project

The Fish Springs Ranch Proposed Action would have short-term impacts to approximately 395 acres (225 acres public land and 170 acres private land) of sagebrush, grassland, and juniper communities during construction of the water transmission pipeline. Approximately 10 acres (4 acres public land and 6 acres private land) of upland vegetation would be permanently removed during construction of wellheads, pumping station, storage and surge tanks, and electrical substation. This Proposed Action would have the same types of impact on vegetation as described previously in "*Impacts Common to Proposed Actions*".

Groundwater drawdown resulting from pumping 8,000 af/yr from production wells at Fish Springs Ranch would have potential to cease or decrease flow from some springs and flowing wells in eastern Honey Lake Valley and southern Smoke Creek Desert. The primary group of flowing springs and wells that could be affected by groundwater pumping consists of 10 wells and five springs located in southern Smoke Creek Desert (HLV-168 through HLV-183, excluding HLV-170 and HLV-181, on **Figure 4-1** and **Table 4-4**). According to groundwater model results, all of the noted springs and wells in southern Smoke Creek Desert may be subject to 5 to 10 feet of groundwater drawdown due to the proposed pumping of 8,000 af/yr. Assuming 5 to 10 feet of drawdown does eventually occur in this part of Smoke Creek Desert, the flowing springs and wells could experience flow reductions. The magnitude of impact, if any, would depend on the source's connection with the aquifer subject to production well pumping, and the initial head or water pressure at each spring and flowing well.

Total riparian or wetland area associated with the springs and flowing well sites in southern Smoke Creek Desert is in the range of 20 to 70 acres (Westech 2004a). Vegetation in these areas could be reduced if the water source is

diminished (e.g., flow from springs and wells) due to proposed production well pumping at Fish Springs Ranch. Additionally, this vegetation could be affected if shallow unconfined groundwater levels are lowered below the plants' rooting depth. It is unknown whether shallow unconfined groundwater occurs in this part of Smoke Creek Desert. Therefore, it is unknown whether groundwater drawdown in this area would adversely affect wetland vegetation.

One spring site (HLV-206) is located between the projected 15- and 20-foot groundwater drawdown contours (**Figure 4-1**), but there was no flow observed in 2004 (Westech 2004a). A small (<0.1 acre) depressional wetland is present at this site which is assumed to be maintained by surface water and probably would not be affected by groundwater drawdown.

Two additional formerly flowing well sites (HLV-202 and HLV-203) are located between the 10- to 15-foot groundwater drawdown contours and one well (HLV-201) is between the 0 and 5-foot drawdown contour as predicted by the model (**Figure 4-1**). The three sites have the following observed riparian or wetland areas: HLV-201 = <0.1 acre, HLV-202 = <1.0 acre, and HLV-203 = <10 acres (Westech 2004a). The riparian or wetland zones could be adversely affected by the proposed pumping if groundwater is lowered below the rooting depth of wetland and riparian plants. Riparian vegetation along a drainage channel at site HLV-201 appears to be maintained by intermittent water in the channel and possibly some subsurface water in channel alluvium. Riparian vegetation at site HLV-202 appears to be maintained by shallow groundwater that could be lowered by proposed groundwater pumping. Riparian vegetation at site HLV-203 appears to be supported by some surface water in Anderson Canyon and from a leaking capped well. This site could be adversely affected if groundwater drawdown substantially lowers the well's water level.

Groundwater extraction of about 4,000 af/yr for irrigation purposes from five wells at Fish Springs Ranch over the last 10 years likely has caused, at least in part, a major spring complex (Fish Springs, HLV-204) and two flowing wells (Lime Rock Well HLV-202 and Desert Well HLV-201) to cease discharging. As described in the *Water Resources* section, there is uncertainty concerning the potential for increased groundwater drawdown to affect additional springs and/or flowing wells.

Impacts Unique to Intermountain Water Supply Project

The Intermountain Water Supply Proposed Action would have short-term impacts to approximately 225 acres (133 acres public land and 92 acres private land) of sagebrush, grassland, and juniper communities during construction of the water transmission pipeline. Approximately 1.0 acre (0.7 acre public land) of upland vegetation would be permanently removed during wellhead development and construction of a pumping station and storage tanks. This Proposed Action would have the same types of impact on vegetation as described in "*Impacts Common to Proposed Actions*".

The Intermountain Water Supply Project would have potential to cease or decrease flow from four springs in Dry Valley (**Figure 4-2**) and six springs in Bedell Flat (**Figure 4-3**) (see "*Water Resources*" section in this chapter). This could reduce available water that supplies wetland habitat associated with these springs. Additionally, wetland vegetation could be affected if shallow unconfined groundwater levels are lowered below the plants' rooting depth. Depth to groundwater in some Dry Valley wells is less than 10 feet below ground surface; therefore, lowering this water table could adversely affect wetland habitat where plant roots extend up to 10 feet. Depth to groundwater in Bedell Flat wells generally is greater than about 50 feet below ground surface. The primary source of water for wetland habitat would be from the springs and not from underlying shallow groundwater. Based on groundwater model predictions and identification of wetland areas by Westech (2004a), less than 13 acres of wetland habitat could be lost or degraded as a result of groundwater drawdown within the zone of influence in each of Dry Valley and Bedell Flat.

Due to uncertainty associated with groundwater model results and the degree of groundwater connection with springs and wetland areas (i.e., groundwater that could be lowered due to proposed production well pumping), it is not possible to accurately quantify the magnitude of impact that could occur over time to these springs and associated wetlands. Lowering groundwater levels caused by the proposed production wells would occur gradually over a period of 100 years or more.

ALTERNATIVE A – CONSTRUCT PIPELINES WITHIN COMMON RIGHT-OF-WAY

This alternative would reduce short-term disturbance to vegetation from pipeline construction by 28 acres. Disturbed areas associated with pipeline crossing of non-wetland waters of the U.S. would be reduced slightly for Alternative A. Potential impacts to wetlands from groundwater drawdown would be similar to effects described for "*Impacts Common to Proposed Actions*".

NO ACTION ALTERNATIVE

No Action for Fish Springs Ranch Project

Under the No Action Alternative for the Fish Springs Ranch Project, groundwater pumping to support irrigation or other use of groundwater would likely continue and could cause lowering of groundwater levels and/or reduced flows in springs, which could affect size and composition of some associated wetlands. The magnitude of affect from continued irrigation pumping, however, is difficult to predict because of uncertainty regarding the amount of irrigation that could occur and connection between groundwater drawdown and source water to flowing wells, springs, and wetlands. Withdrawals of groundwater for irrigation occur seasonally, which allows for some groundwater recovery during periods of non-pumping. Groundwater extraction of about 4,000 af/yr for irrigation purposes from five wells at Fish Springs Ranch over the last 10 years likely has contributed to elimination and reduction of flow from some springs and flowing wells, and also may have eliminated or reduced some wetland areas.

No Action for Intermountain Water Supply Project

Under the No Action Alternative, Intermountain Water Supply could pump groundwater for beneficial uses approved by the State Engineer, up to the amount of water provided in their existing water rights. No specific uses for water other than those described in the Proposed Action for Intermountain Water Supply have been identified. Surface occupancy to allow development of two of the proposed wells included in Intermountain Water Supply's Proposed Action would require issuance of a right-of-way from BLM.

Selection of the No Action Alternative for the Intermountain Water Supply Project would eliminate predicted impacts to vegetation associated with this Proposed Action. To the extent that Intermountain Water Supply could proceed with groundwater withdrawal to exercise their existing water rights from well locations on private land, some vegetation associated with springs and seeps could be impacted.

MONITORING AND MITIGATION MEASURES

Measures Common to Proposed Actions

Potential measures to mitigate and monitor for impacts to vegetation include:

- Use variable seed mixes adapted to slope and aspect, soil depth, and landscape features to reclaim areas disturbed by construction.
- Seed and plant shrubs (including sagebrush) in patches rather than uniformly over the area.
- Prevent livestock grazing of reclamation until stable and resilient vegetation cover has been established.
- Monitor disturbed and reclaimed areas for noxious weeds and other undesirable species; if noxious weeds are found, they would be controlled.
- Monitor reclamation yearly to assess success of seeding and planting and implement remedial measures if needed.
- Water roads during construction to minimize impacts from dust.
- Conduct searches for cacti and transplanting them to suitable habitat undisturbed by proposed activities.
- Monitor wetland areas for possible changes in vegetation or water source (see mitigation measures in "*Water Resources*" section of this chapter for potential measures to address adverse impacts attributed to production well pumping). Wetland banking or other off-site mitigation could be implemented if adverse impacts occur to wetland areas.

A vegetation monitoring plan should be developed in consultation with appropriate agencies. This plan could include threshold levels by which one or more mitigation measures would be implemented. Mitigation

would be the responsibility of the pumping well owner or operator whose well is causing the adverse effect.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Fish Springs Ranch Project

The Fish Springs Ranch Proposed Action would result in the irreversible and irretrievable loss of about 10 acres of sagebrush, grassland, and juniper plant communities from construction of permanent facilities. Loss or reduction in flow from springs/wells and associated wetlands would be for the duration of the Project, but if groundwater pumping were stopped, flows from springs/wells and associated wetland vegetation could eventually recover to approximate pre-project levels. This recovery period is unknown, but likely would be many years depending on the total period of pumping, extent of wetland habitat loss, and whether recovery occurs naturally or is assisted through a revegetation program.

Intermountain Water Supply Project

The Intermountain Water Supply Proposed Action would result in the irreversible and irretrievable loss of less than 1.0 acre of sagebrush, grassland, and juniper communities from construction of permanent above-ground facilities. Loss or reduction in flow from springs/wells and associated wetlands would be for the duration of the Project, but if groundwater pumping were stopped, flows from springs/wells and associated wetland vegetation could eventually recover to approximate pre-project levels after many years.

RESIDUAL EFFECTS

Effects Common to Proposed Actions

Residual effects would remain where lowered groundwater levels and/or reduced flow from springs/wells caused by production well pumping would have a permanent effect on associated wetlands, unless mitigation measures would maintain vegetative conditions.

WILDLIFE RESOURCES

SUMMARY

Direct impacts to wildlife resources resulting from the Proposed Actions would be short-term loss of habitat and displacement or loss of wildlife as a result of construction activities. Construction of permanent above-ground facilities would remove habitat and displace wildlife. Most wildlife species in the Projects Area are associated with sagebrush and grassland communities and juniper woodlands. Construction of well heads, pump stations, storage tanks, and electrical substation would result in approximately 10 acres of permanent habitat loss associated with the Fish Springs Ranch Project and 1 acre of habitat loss with the Intermountain Water Supply Project.

Construction of water transmission pipelines would result in temporary disturbance of approximately 395 acres habitat for the Fish Springs Ranch Project and 225 acres for the Intermountain Water Supply Project. Depending on success of reclamation, habitat disturbed by pipeline construction would have reduced capacity to support existing wildlife populations for 3 to 5 years or longer. Species dependent on sagebrush habitat could experience reduced habitat quality if sagebrush does not re-establish on reclaimed pipeline rights-of-way and other areas. Breeding and foraging habitat for sage grouse, a sensitive species, would be reduced as a result of the Projects; however, this loss would not likely affect regional populations and distribution of sage grouse once successful reclamation has been achieved. No known historic leks would be affected.

The threatened bald eagle would not likely be affected by the proposed Projects through reduction or loss of short-term foraging opportunities in upland habitats and long-term effects due to possible reductions in wetland habitat. This change in wetland habitat, if any, would be a result of lowered groundwater levels and/or reduced flow from springs and flowing wells resulting from proposed production well pumping. The Fish Springs Ranch proposed pumping could reduce natural groundwater flow to Pyramid Lake Valley from eastern Honey Lake Valley and Smoke Creek Desert (via Astor and Sand Passes). Estimated potential reduction of groundwater flow is about 0.04 percent of average annual flow into Pyramid Lake from the Truckee River. The potential reduction in groundwater recharge to Pyramid Lake would not affect Lahontan cutthroat trout and Cui-ui. There would be no effect on surface flow to Pyramid Lake in the Truckee River, which is the major component of source water to the lake.

The endangered Carson wandering skipper would not be directly affected by habitat removal from pipeline construction activity and permanent facilities (no loss of habitat would occur). Reduction in flow from springs or flowing wells resulting from groundwater withdrawal may affect the Carson wandering skipper through loss of habitat. Potential habitat loss for the bald eagle is expected to be minor in a regional context due to other springs and wetlands in the area that have little or no potential of being affected by groundwater withdrawal from the Proposed Actions.

DIRECT AND INDIRECT IMPACTS

Impacts Common to Proposed Actions

Impacts to wildlife resources within and adjacent to the proposed rights-of-way would be short-term and occur during construction of water transmission pipelines. Construction of the proposed pipelines would remove sagebrush, grassland, and juniper habitat through ground disturbance, removal of vegetative cover, activities associated with preparation and installation of pipelines, and restoration of surface contours. Wildlife would also be affected during construction by vehicular traffic, blasting, and increased levels of human activity.

Wildlife species dependent on these disturbed sites would be killed or displaced. Displaced animals may be incorporated into adjacent populations, depending on variables such as species behavior, density, and habitat quality. Adjacent populations may experience increased mortality, decreased reproductive rates, or other compensatory or additive responses.

Species that would experience greatest impacts from loss of sagebrush and grassland habitats include black-tailed jackrabbit, mountain cottontail, mule deer, and pronghorn antelope. Mule deer and antelope using the Study Area would be displaced during construction activities. Removal of sagebrush habitat would reduce capacity of the Projects Area to support regional populations of mule deer and antelope by a small incremental amount. Due to the difficulty of successful reestablishing sagebrush on pipeline rights-of-way, adverse effects from habitat loss could extend for longer than 5 years.

Lizards and snakes would be killed by construction activities and vehicle traffic. Often lizards and snakes seek cover underground and removal of soil and rock would result in direct mortality. No reptiles have been identified in the Study Area for which reduced population viability or reduction in habitat poses a threat to their continued existence regionally and locally.

Migratory birds that would experience loss of foraging and nesting habitats in sagebrush-grasslands and juniper woodlands include western kingbird, horned lark, northern flicker, gray flycatcher, ash-throated flycatcher, pinyon jay, mountain chickadee, house wren, blue-gray gnatcatcher, mountain bluebird, green-tailed towhee, spotted towhee, chipping sparrow, loggerhead shrike, Say's phoebe, horned lark, rock wren, lark sparrow, western meadow lark, American kestrel, American robin, Brewer's sparrow, vesper sparrow, sage sparrow, and sage thrasher. If construction were to take place in the nesting and brood-rearing period, young birds would be killed and nests would be destroyed. Scheduling ground-clearing activities to avoid nesting and brood-rearing periods would avoid impacts to migratory birds.

Raptors would be affected by loss of prey base in sagebrush/grasslands and potential nesting habitat in juniper woodlands. Because most raptors usually range over a large area, this loss would not be quantifiable and would not result in a change in raptor diversity. Some raptors would be able to take advantage of prey availability in reclaimed habitats. Often in the early stages of reclamation, growth of grasses and forbs on pipeline rights-of-way are attractive to rabbits, mice, and voles; favored prey for a number of raptor species. No known raptor nests would be directly affected by the Proposed Actions.

Noise levels associated with the proposed Projects would increase primarily during the construction period, displacing some animals an unknown distance from the noise source. Some species would likely abandon habitat near high levels of noise and human disturbance; whereas, others would become accustomed to noise and associated human activity and resume their use of otherwise unaffected habitat.

Special Status Species

Bald Eagle (Threatened)

Although bald eagles are primarily associated with aquatic habitats because of the presence of fish and waterfowl (favored winter prey), they also forage over upland sites for rodents and carrion. Potential winter foraging habitat for bald eagles would be reduced over the short-term (3 to 5 years) until grasses and forbs become established on water transmission pipeline rights-of-way. With establishment of

herbaceous species on areas disturbed by construction activities, availability of prey species (e.g., black-tailed jackrabbits, cottontail rabbits, and other small mammals) would equal or surpass existing population densities. Short-term incremental reduction in the prey base of these species would slightly reduce foraging areas for the bald eagle, but this reduction would be slight in a regional context and would not affect population density and distribution.

Possible reduction or loss of flow from springs and flowing wells resulting from groundwater pumping and associated drawdown could degrade waterfowl habitat associated with affected water discharges. Ducks often feed and rest at areas of surface water during migration and over winter. During winter when other surface water sources are frozen, springs and flowing wells often remain free of ice and are attractive to ducks and other waterfowl. Reductions in waterfowl winter habitat may adversely affect bald eagles through reduced foraging opportunities; however, reduced wintering habitat at affected springs could also tend to concentrate waterfowl use at unaffected springs, rendering waterfowl more susceptible to eagle predation. From a regional perspective, the spring and wetland areas that could be affected by production well pumping would be minor, and numerous other surface water sites in the Study Area would not be affected by the proposed pumping.

Lahontan Cutthroat Trout (Threatened)

Lahontan Cutthroat trout in Pyramid Lake would not be affected by construction of water transmission pipelines and infrastructure. Potential effects from groundwater pumping on recharge to Pyramid Lake, if any, would be slight and not affect Lahontan cutthroat trout. Groundwater pumping from the Intermountain Water Supply Project would not affect groundwater recharge to Pyramid Lake.

Cui-ui (Endangered)

Cui-ui in Pyramid Lake would not be affected by construction of pipelines and infrastructure. Potential effects from groundwater pumping on recharge to Pyramid Lake, if any, would be slight and not affect Cui-ui. Groundwater pumping from the Intermountain Water Supply Project would not affect groundwater recharge to Pyramid Lake.

Carson Wandering Skipper (Endangered)

Construction of pipelines and permanent facilities associated with the Fish Springs Ranch Project and Intermountain Water Supply Project would not directly affect habitat for the Carson wandering skipper (no loss of habitat would occur). Reduction in flow from springs or flowing wells resulting from groundwater withdrawal may affect the Carson wandering skipper through loss of habitat. Habitat that may be affected by the Proposed Actions is present at the following areas (Sanford 2004a): Cal Neva Road, South Alkali Flat, and East Alkali Flat in eastern Honey Lake Valley; West Smoke Creek in southern Smoke Creek Desert; Upper and Lower Dry Valley; and Bedell Flat NW01 and NW02 (**Figures 3-7** and **4-1**). These areas are discussed in more detail under the sections "*Impacts Unique to Fish Springs Ranch Project*" and "*Impacts Unique to Intermountain Water Supply Project*".

Sensitive Species

Bats

Construction activities and removal of habitat may have short-term effects on bats through displacement from foraging habitat; however, no caves, mine, adits, or other habitats favored as roosting and breeding areas for bats would be affected by the proposed Projects. Reduction or loss of flow from springs or flowing wells due to effects of lowered groundwater levels from production well pumping could adversely affect bats. These water sources typically have open water surfaces and wetlands important to foraging bats. Water sources are critical to bats because they drink from open water and insects are more abundant around wetlands and open water. Studies in desert habitats have found that bat activity is 40 times greater near wetlands and riparian areas than in upland areas (Nevada Bat Working Group 2002). Even high-elevation tree roosting bats fly to open water, wetlands, and riparian areas to drink and forage.

Pygmy Rabbit

Potentially suitable pygmy rabbit habitat along water transmission pipeline corridors would be removed; however, pygmy rabbits are not known to occur in the Study Area; consequently, the Proposed Actions would not directly affect this species. Loss of sagebrush habitat would be a small incremental reduction locally and regionally, but would not affect population viability of distribution regionally.

Preble's Shrew

Potential habitat for Preble's shrew (sagebrush/grasslands and wetlands) could be affected by the proposed Projects. It is not known if Preble's shrew is present in the Study Area. If present, the proposed Projects could result in direct mortality through excavation and other construction activities. Little is known about the life history, distribution, and ecology of this species. Consequently, it is uncertain how loss of habitat and potential direct mortality from the Proposed Actions would affect viability of local populations. Because of wide geographic distribution of this species and apparent broad range of habitat, it is likely that the proposed Projects would have little effect on regional populations.

Sage Grouse

No active sage grouse courtship sites (leks) would be affected by the Proposed Actions; however, sagebrush, grassland and riparian habitats that would be removed provide nesting, brood rearing, and wintering habitat. If construction were to take place during the nesting and brood-rearing period, mortality to chicks and nestlings could occur. The Proposed Actions could result in incremental removal of habitat and an associated reduction in the capacity of local and regional habitats to support sage grouse.

Swainson's and Ferruginous Hawks

The proposed Projects would remove foraging habitat over the short-term along water transmission pipeline rights-of-way for Swainson's and ferruginous hawks, but no known nest sites would be affected.

Incremental reduction in the prey base of these species by the proposed Projects would slightly reduce the foraging area for these raptors for 3 to 5 years, but this reduction would be slight in a regional context and would not likely affect population density.

Impacts Unique to Fish Springs Ranch Project

The Fish Springs Ranch Proposed Action would directly affect approximately 225 acres of wildlife habitat on federal land and 170 acres of habitat on private land (see **Table 2-1**). Of this acreage, 16 acres would be permanently affected due to constructed above-ground facilities (e.g., pump stations, wells, storage tanks, and electrical substation). The remaining 387 acres would be temporary disturbance associated with the construction of the buried water transmission pipelines. This Proposed Action would have the same types of impacts on wildlife and wildlife habitat as described in "*Impacts Common to Proposed Actions*".

The Fish Springs Ranch Project would have the potential to eliminate or decrease flow in several springs and flowing wells (see "*Water Resources*" section in this chapter), thereby possibly reducing available surface water and wetland habitat. **Figure 4-1** shows the maximum steady-state groundwater drawdown area predicted by a model for proposed pumping of 8,000 af/yr in eastern Honey Lake Valley. Up to about 70 acres of wetland habitat could be lost or degraded by lowered groundwater levels and/or reduced flow from springs and wells. As previously stated in the "*Vegetation Resources*" section of this chapter, the magnitude of impact, if any, to wetland areas is difficult to quantify because of uncertainty regarding connection of wetland source water to groundwater in the aquifers that would be subject to dewatering by production wells.

Special-Status Species

Lahontan Cutthroat Trout

Groundwater recharge to Pyramid Lake could be affected by groundwater depletions in aquifers resulting from proposed pumping (see *Water Resources* section in this chapter). Natural groundwater flow to Pyramid Lake Valley from eastern Honey Lake Valley via Astor Pass and from Smoke Creek Desert could be reduced by about 10 percent due to proposed pumping at Fish Springs Ranch. This estimate does not consider groundwater recharge to Pyramid Lake from other areas nor the contribution of the Truckee River. The Truckee River, the primary source of recharge to Pyramid Lake, on average, discharges about 410,000 af/year to the lake. Estimated reduction of groundwater flow to Pyramid Lake Valley from pumping at Fish Springs Ranch (i.e., 650 af/yr) would be about 0.2 percent of surface water flow to the lake from the Truckee River. The relatively minor decrease, if any, in groundwater recharge to Pyramid Lake resulting from pumping at Fish Spring Ranch would not affect Lahontan cutthroat trout. The Truckee River as primary source of recharge to Pyramid Lake and the only spawning location for the Pyramid Lake population of Lahontan cutthroat trout would not be affected by the proposed Project.

Although modeling indicates that groundwater recharge to Pyramid Lake could be reduced by

groundwater pumping in eastern Honey Lake Valley, some investigators do not believe that there is a groundwater connection between Honey Lake Valley, Smoke Creek Desert, and Pyramid Lake Valley (Bohm 1990; Moll 2000; Varian 1997). If this is the case, proposed pumping at Fish Springs Ranch would not affect groundwater recharge to Pyramid Lake.

Cui-ui

Potential effects from groundwater pumping on Cui-ui would be similar to effects on Lahontan cutthroat trout. Slight reductions in groundwater flow from Honey Lake Valley to Pyramid Lake Valley, if any, would not affect spawning habitat or the primary water source to Pyramid Lake, the Truckee River.

Carson Wandering Skipper

Some wetland areas in eastern Honey Lake Valley within the predicted groundwater drawdown zone of influence are potentially suitable habitat for Carson wandering skipper (Cal Neva Road, South Alkali Flat, East Alkali Flat, and West Smoke Creek; **Figure 4-1**), although the species has been documented at only one location (East Alkali Flat). Habitat in the East Alkali Flat area, however, does not appear to be optimal for this butterfly species (Sanford 2004a). Edges of playas may provide the best habitat for Carson wandering skipper; this habitat, however, is rare in the Projects Area east of Honey Lake (Sanford 2004a).

Carson Wandering skipper habitat quality at East Alkali Flat would decrease if groundwater pumping dries out salt grass habitats. Similarly, groundwater pumping, if it results in desiccation of potential Carson wandering skipper habitat would reduce habitat quality at other sites of potentially suitable habitat in eastern Honey Lake Valley and southern Smoke Creek Dessert, although the skipper has not been documented to use habitats at these locations.

Impacts Unique to Intermountain Water Supply Project

The Intermountain Water Supply Proposed Action would directly affect 225 acres, of which 133 acres are public land and 92 acres are private land. Construction along water transmission pipeline corridors would temporarily decrease habitat quality on these areas. Construction of permanent facilities (e.g., pumping station, wells, and storage tanks) would affect less than 1 acre on private land. This Proposed Action would have the same types of impact on wildlife and wildlife habitat as described previously in "*Impacts Common to Proposed Actions*".

Based on groundwater model results, the Intermountain Water Supply Project potentially could eliminate or decrease flow from four springs in Dry Valley and six springs in Bedell Flat (see "*Water Resources*" section in this chapter). This could reduce available water that supplies wetland habitat associated with these springs. **Figures 4-2** and **4-3** show the maximum steady-state groundwater drawdown area predicted by flow models for proposed pumping of 3,000 af/yr in Dry Valley and 500 af/yr in Bedell Flat, respectively. Wetland vegetation could be affected if shallow unconfined groundwater levels are lowered below the plants' rooting depth. Depth to groundwater in some Dry Valley wells is less than 10 feet below ground surface; therefore,

lowering this water table could adversely affect wetland habitat where plant roots extend to depths approaching 10 feet. Depth to groundwater in Bedell Flat wells generally is greater than about 50 feet below ground surface; therefore, the primary source of water for wetland habitat would be from the springs and not from underlying shallow groundwater.

Based on groundwater model predictions and identification of wetland areas by Westech (2004a), 5 to 13 acres of wetland habitat could be lost or degraded as a result of groundwater drawdown within the zone of influence in each of Dry Valley and Bedell Flat. These areas, if adversely affected, also could affect wildlife.

Due to uncertainty associated with groundwater model results and the degree of groundwater connection with springs and wetland areas (i.e., groundwater that could be lowered due to proposed production well pumping), it is not possible to accurately quantify the magnitude of impact that could occur over time to these springs, wetlands, and associated wildlife habitat. Lowering groundwater levels caused by the proposed production wells would occur gradually over a period of 100 years or more.

Lahontan Cutthroat Trout and Cui-ui

Groundwater pumping from Intermountain Water Supply wells in Dry Valley and Bedell Flat would not affect groundwater recharge to Pyramid Lake; consequently, these proposed Projects would not affect Lahontan cutthroat trout or Cui-ui.

Carson Wandering Skipper

Some wetland areas in the Projects Area are potentially suitable habitat for Carson wandering skipper, although the species has not been documented in Dry Valley or Bedell Flat (Sanford 2004a). Potential habitat for Carson wandering skipper has been identified by Sanford (2004a) at Upper and Lower Dry Valley areas (**Figure 4-2**), and Bedell Flat NW01 and NW02 (**Figure 4-3**). The two habitat areas in Dry Valley could be affected by proposed production well pumping where springs DVC-81 and DVC-82 provide water to the Dry Valley Creek channel bottom area (**Figure 4-3**). The two Carson wandering skipper habitat areas in Bedell Flat could be affected by lowered groundwater levels from groundwater pumping because the Campbell/Raintree spring (BF-142) is located in these areas (**Figure 4-3**). Edges of playas may provide the best habitat for Carson wandering skipper; this habitat, however, is rare in Dry Valley and Bedell Flat (Sanford 2004a).

It is unknown if groundwater pumping from wells in lower Dry Valley would affect Carson wandering skipper habitat in Winnemucca Valley (see *Water Resources* section in this chapter). Groundwater pumping from Bedell Flat could reduce natural groundwater flow (780 af/yr) to Warm Springs Valley by 160 af/yr. The USGS (Lopes and Evetts 2004) estimates that there is 6,000 af/yr of natural recharge to groundwater in Warm Springs Valley, with 5,000 af/yr currently being pumped from the valley (including Winnemucca Valley). If the proposed groundwater pumping from Bedell Flat and/or Dry Valley reduces groundwater flow to Warm Springs Valley (including Winnemucca Valley), any adverse effects from

existing groundwater pumping on Carson wandering skipper habitat in Winnemucca Valley could be exacerbated.

Brussard *et al.* (1999) indicate that drawdown from domestic wells is a threat to habitat for the Carson wandering skipper at the Winnemucca Ranch Road site. It is likely that at the existing rate of groundwater withdrawal from Warm Springs Valley (approximately 5,000 af/yr), Carson wandering skipper habitat maintained by groundwater discharge could be affected as groundwater drawdown areas expand.

ALTERNATIVE A – CONSTRUCT PIPELINES WITHIN COMMON RIGHT-OF-WAY

This alternative would reduce short-term disturbance of wildlife habitat from pipeline construction by 28 acres. Disturbed areas associated with pipeline crossing of non-wetland waters of the U.S. would be reduced slightly for Alternative A. Potential impacts to springs and wetlands from lowered groundwater levels associated with production well pumping would be similar to effects described for "*Impacts Common to Proposed Actions*".

NO ACTION ALTERNATIVE

No Action for Fish Springs Ranch Project

Under the No Action Alternative for the Fish Springs Ranch Project, groundwater pumping to support irrigation or other uses would likely continue and could cause lowering of groundwater levels and/or reduced flows in springs, which could affect size and composition of some associated wetlands and wildlife habitat. The magnitude of affect from continued irrigation pumping, however, is difficult to predict because of uncertainty regarding connection between groundwater drawdown and source water to springs and wetlands. Withdrawal of groundwater for irrigation occurs seasonally, which allows for some groundwater recovery during periods of non-pumping.

No Action for Intermountain Water Supply Project

Under the No Action Alternative, Intermountain Water Supply could pump groundwater for beneficial uses approved by the State Engineer, up to the amount of water provided in their existing water rights. No specific uses for water other than those described in the Proposed Action for Intermountain Water Supply have been identified. Surface occupancy to allow development of two of the proposed wells included in Intermountain Water Supply's Proposed Action would require issuance of a right-of-way from BLM.

Selection of the No Action Alternative for the Intermountain Water Supply Project would eliminate predicted impacts to wildlife resources associated with this Proposed Action. To the extent that Intermountain Water Supply could proceed with groundwater withdrawal to exercise their existing water rights from well locations on private land, some wildlife species that rely on springs and seeps for water could be impacted.

MONITORING AND MITIGATION MEASURES

Measures Common to Proposed Actions

Potential monitoring and mitigation measures to help avoid, reduce, or compensate for impacts to wildlife include:

- Schedule construction activities to avoid the nesting and brood-rearing period for birds;
- Reduce livestock grazing and trampling on revegetated pipeline corridors;
- Seed and plant sagebrush and other fire-sensitive species that have been removed or reduced by wildfire and Project implementation;
- Replace topsoil over pipeline trenches to enhance establishment of sagebrush and other native species;
- Implement best management practices to prevent delivery of sediment to drainages and wetlands along proposed pipeline routes;
- Potential impacts to Carson wandering skipper could be reduced by restricting access on Winnemucca Ranch Road from May 15 to July 31.
- Monitor effects of groundwater drawdown on spring flow and associated wildlife habitat (see *Monitoring and Mitigation Measures* section in "*Water Resources*" section of this chapter for potential measures to address adverse impacts attributed to production well pumping); and
- Monitor effects of groundwater drawdown on use of springs and associated wetlands by bats, Carson wandering skipper, and other species closely tied to perennial surface water.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Fish Springs Ranch Project

The Fish Springs Ranch Proposed Action would result in the irreversible and irretrievable loss of about 16 acres of wildlife habitat from construction of permanent facilities. Loss or reduction in flow from springs and associated wetlands would be for the duration of the Project, but if groundwater pumping were stopped, flow from springs and associated wildlife habitat could eventually recover to approximate pre-project levels. This recovery period is unknown, but likely would be many years depending on the total period of pumping,

extent of wetland habitat loss, and whether recovery occurs naturally or is assisted through a revegetation program.

Intermountain Water Supply Project

The Intermountain Water Supply Proposed Action would result in the irreversible and irretrievable loss of less than one acre of wildlife habitat from construction of permanent above-ground facilities. Loss or reduction in flow from springs and associated wetlands would be for the duration of the Project, but if groundwater pumping were stopped, flow from springs and associated wildlife habitat could eventually recover to approximate pre-project levels after many years.

RESIDUAL EFFECTS

Effects Common to Proposed Actions

Residual effects would remain where lowered groundwater levels and/or reduced flow from springs caused by production well pumping would have a permanent effect on associated wildlife habitat, unless mitigation measures would maintain habitat conditions.

ACCESS AND LAND USE

SUMMARY

Access

Implementation of the Proposed Actions would have short-term impacts to access routes in the North Valleys Planning Area ranging from minor traffic delays to increased traffic associated with transporting materials, equipment, and personnel to construction sites.

Land Use

The Proposed Actions would result in approximately 620 acres of surface disturbance of which 358 acres would occur on public land (225 Fish Springs Ranch/133 acres Intermountain Water Supply). The Fish Springs Ranch Project would disturb approximately170 acres of private land and the Intermountain Water Supply Project 92 acres. While land ownership would remain unchanged, grazing and public use of the areas may experience short-term disruption during construction. Following reclamation, disturbed areas would be returned to previous uses. Grazing allotments or stocking rates would not be affected by the Proposed Actions.

DIRECT AND INDIRECT IMPACTS

Impacts Common to Proposed Actions

Access

Increased traffic along Red Rock Road, Winnemucca Ranch Road, and Lemon Valley Drive would occur during construction. Intensity on specific roads would vary as construction of the proposed Projects progresses from one area to another. Crew sizes for specific tasks would vary from three to eight people and would involve up to 10 vehicle roundtrips per day. Trucks used to transport equipment and materials would likely range from three to six roundtrips per day for each Project.

Land Use

Under the Proposed Actions, active construction areas in the rights-of-way and at the pump station in Bedell Flat would not be available for recreational or grazing use until construction activities are completed. Those engaged in activities that require unrestricted use of the area would need to adjust to the presence of short-term construction operations by relocating or modifying their activities in the area. Recreationists may drive further into the area to find a suitable location for their activity or avoid that portion where construction operations are occurring. Once construction activities are completed, land use and public activities would be allowed.

Grazing allotments or stocking rates would not be affected by the Proposed Actions. Livestock grazing would experience short-term disruption during construction.

ALTERNATIVE A – CONSTRUCT PIPELINES WITHIN COMMON RIGHT-OF-WAY

Common to Proposed Actions

Impacts to Access and Land Use under Alternative A would be similar to those described under the Proposed Actions. An overall reduction of 28 acres of surface disturbance would result from implementation of Alternative A.

NO ACTION ALTERNATIVE

Common to Proposed Actions

Access

If the proposed Projects are not authorized, impacts associated with increased traffic along the access routes would not occur.

Land Use

Under the No Action Alternative, current land use in the North Valleys Planning Area would continue.

MONITORING AND MITIGATION MEASURES

Common to Proposed Actions

Potential impacts to Carson wandering skipper could be reduced by restricting access on

Winnemucca Ranch Road from May 15 to July 31.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Common to Proposed Actions

Land affected by construction under the Proposed Action would be reclaimed. Current land use would not be irreversibly or irretrievably modified.

RESIDUAL ADVERSE EFFECTS

Common to Proposed Actions

No residual adverse effects on land use and access are anticipated since reclamation of disturbed surfaces would restore land to previous uses, including recreation, wildlife habitat, and grazing.

Development of the proposed Projects would not preclude access to public land during construction or operation of the wells, water transmission pipelines, and other associated facilities. Existing access routes across public land in the Projects Area would be maintained, thereby eliminating potential direct and indirect impacts to land access.

Existing land use in the Projects Area would not be affected during construction and operation of the wells and water transmission pipelines. Impacts to grazing allotments and restricted use of the disturbance areas would be short-term and confined to construction activities occurring within the respective rights-of-way. Reclamation of disturbed areas would be concurrent as construction operations progress toward completion.

RECREATION

SUMMARY

Current BLM land use policy for the Study Area allows for a variety of activities including recreation, mining, and grazing. Recreational opportunities in the North Valleys Planning Area includes organized events, such as motorcycle races, dog trials, cattle drives, and equestrian events. This area also provides open space for diverse recreational activities such as hiking, horseback riding, hunting, mountain biking, cross-country motorcycling, and off-highway vehicle use. The BLM's Carson City Field Office manages organized events in the North Valleys Planning Area to reduce potential for user conflict; however, diverse activities are generally unrestricted as to when and where they may occur.

Under the Proposed Actions, recreational users of public land in the North Valleys Planning Area would potentially be required to find other locations for specific activities and events or event staging areas if such activities conflicted with construction operations.

DIRECT AND INDIRECT IMPACTS

Impacts Common to Proposed Actions

Off-highway vehicle (OHV) enthusiasts are the largest group of dispersed recreationists using public land in the Projects Area. During construction of the Projects, activities that require large areas of open space, such as motorcycle races, horseback riding, dog trials, cattle drives, and "coyote chasing" may occasionally intercept active construction areas and haul routes. Individuals participating in these activities would need to alter their routes or relocate to other areas to avoid contact with construction operations. Upon completion of construction and reclamation activities, these areas would be returned to previous uses.

BLM coordinates organized events in the North Valleys Planning Area through a permit system. Activities that currently take place in the proposed Projects Area could be relocated to other areas. Since most organized recreational activities occur on weekends, and construction operations occur Monday through Friday, the resulting impacts to events would be minor considering the large amount of available public land remaining in the area and the relative infrequency of these events.

Hunting is not a predominant dispersed activity in the Study Area. According to Nevada Division of Wildlife, only 20 resident permits for mule deer were issued in 2003 for hunting in game management unit 021 that encompasses the North Valleys Planning Area. Less than 15 permits for pronghorn have been issued annually for the past three hunting seasons in two combined game management units in the area, including unit number 021. No evidence of mule deer or pronghorn was recorded during a reconnaissance of the Projects Area during June 2004. Given the small percentage of public land affected by the Proposed Actions, impacts to big game hunting are expected to be negligible both in terms of the availability of game species and remaining habitat. Statistics were not available for upland game bird hunting; however, it is expected that impacts to bird hunting would also be minimal given the large amount of available habitat remaining in the North Valleys Planning Area.

Impacts to persons using the North Valleys Planning Area for dispersed recreational activities such as hiking, jogging, mountain biking, and motocross/OHV would include exposure to noise from construction equipment, dust from construction activity, and visual impacts on the landscape – all of which may negatively impact the sense of solitude or sense of "openness" enjoyed during these types of activities. Users may resort to increasing driving distance to other locations in the area to avoid these impacts. However, given the amount of land in the area available for dispersed recreational activities, these types of impacts are considered minor because the Projects do not preclude these uses altogether but rather requires adaptation or relocation to other areas. In addition, the construction period associated with installation of the water transmission pipelines is a short duration activity.

Impacts Unique to Fish Springs Ranch Project

No unique direct or indirect impacts to Recreation associated with the Fish Springs Ranch Project have been identified.

Impacts Unique to Intermountain Water Supply Project

No unique direct or indirect impacts to Recreation associated with the Intermountain Water Supply Project have been identified.

ALTERNATIVE A – CONSTRUCT PIPELINES WITHIN COMMON RIGHT-OF-WAY

Impacts to recreation opportunities under Alternative A would be similar to those described under the Proposed Actions.

NO ACTION ALTERNATIVE

Common to Proposed Actions

Under the No Action Alternative, recreation in the North Valleys Planning Area would continue as it presently exists.

MONITORING AND MITIGATION MEASURES

Measures Common to Proposed Actions

The BLM would provide 30 days prior notice to Fish Springs Ranch and Intermountain Water Supply for all permitted recreational events that would occur in the vicinity of the Projects Area. This may require a temporary modification of the respective work schedules to accommodate events.

No other monitoring and mitigation measures beyond those described in the "*Proposed Action*" section of Chapter 2 have been identified to reduce impacts to Recreation.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Common to Proposed Actions

The Proposed Actions would not irreversibly or irretrievably affect recreation resources. Following reclamation, the rights-of-way would blend with surrounding topography and habitat.

RESIDUAL EFFECTS

Fish Springs Ranch Project

Residual effects would include electrical substation, pump station, storage tanks, and wellhead structures in Honey Lake Valley. Visual impacts associated with above-ground structures of the respective Proposed Actions are addressed in the *Visual Resources* section of this chapter.

Intermountain Water Supply Project

Residual effects would include wellhead structures in Dry Valley and Bedell Flat, and pump station and storage tanks in Bedell Flat. Visual impacts associated with above-ground structures of the respective Proposed Actions are addressed in the *Visual Resources* section of this chapter.

NOISE

SUMMARY

Major sources of noise associated with the Proposed Actions would be from construction related equipment and is predicted to be less than the maximum allowed by Washoe County Code. Noise generated by increased truck traffic transporting materials and equipment would increase along access routes to the Projects Area but would be of short duration. Construction noise levels would be short-term, brief, and intermittent. Long-term noise levels associated with wellhead, pump station, and pipeline operations would generally be steady and continuous, and predicted to be at lower levels than construction noise.

DIRECT AND INDIRECT IMPACTS

Impacts Common to Proposed Actions

Noise generated by the Proposed Actions would vary during pipeline construction and operation. The Study Area is rural with scattered residences and some wildlife species. The Washoe County Development Code was used to evaluate Project noise levels on humans, which regulates the maximum noise level at the nearest residential and public use facilities at L_{dn} 65 dBA (Washoe County 1996). The EPA L_{dn} 55 dBA guideline (EPA 1979) was used to evaluate Project noise levels on wildlife.

Equipment used during construction activities would include drill rigs and standard construction and earth moving equipment (e.g., scrapers, backhoes, graders, trenchers, and bulldozers). Each piece of equipment can typically generate intermittent noise levels up to 90 dBA at a distance of 50 feet from the equipment (DOT 1995). However, equipment noise can vary considerably depending on age, condition, manufacturer, use during a time period, and a changing distance from the equipment to a listener location.

Short-term noise levels during construction of the proposed Fish Springs Ranch and Intermountain Water Supply projects are predicted to not exceed Washoe County requirements of L_{dn} 65 dBA at approximately 445 feet and EPA guideline of L_{dn} 55 dBA at approximately 1,335 feet from construction equipment used on the Projects.

If blasting becomes necessary during the course of construction of either the Fish Springs Ranch or Intermountain Water Supply projects, noise generated is predicted to meet the peak 122 dBC level human annoyance guideline of the U.S. Army at approximately 1,000 feet from the point of detonation, but may be audible within a 5-mile radius. Possible locations where blasting may be necessary have not been identified, and if it does occur, the blast noise would be essentially instantaneous, and not likely occur on a regular basis.

Although EPA and U.S. Army noise level guidelines are associated with human response to noise, it is difficult to accurately predict long-term effects of noise on wildlife. Wildlife response to noise is a function of many variables including characteristics of the noise,

duration, life history characteristics of the species, habitat type, season, current activity of the animal, sex, age, previous noise exposure, and other physical stressors such as drought (Bommer and Bruce 1996). General wildlife responses to noise are summarized in the following list (Bommer and Bruce 1996; EPA 1971):

- Most animals habituate to sounds disassociated with other threatening stimuli.
- Steady sounds are less prone to startle animals than sounds with fast rise times.
- Sight and actions of noise sources can cause greater impact than the noise itself.
- Noise that causes species to avoid critical-use areas can adversely affect the populations.
- Animals can be more sensitive to noise in certain locations and at certain times of year.
- Herding or flocking animals are often as sensitive as the most sensitive individual in the group.
- Different species and individual animals within a species have different levels of noise tolerance and habituation.
- Behavioral and physiological responses to noise have the potential to cause injury, energy loss, decreases in food intake, habitat avoidance, habitat abandonment, and reproductive losses.
- Animals that rely on auditory systems for courtship, mating, prey location, predator detection, and homing would be more threatened by increased noise levels due to man-made sources than species that primarily use other senses in a natural setting.

Loss of habitat and increased noise levels associated with the Proposed Actions may displace some animals and cause them to relocate an unknown distance. However, most animals would become habituated to long-term noise and resume use of habitat.

Impacts Unique to Fish Springs Ranch Project

Construction and operation of an electrical substation to provide power to well field pumps and pump station for the Fish Springs Ranch Project would eliminate impacts of noise as compared to diesel generators. For the production wells operating on electric power from distribution lines, Washoe County L_{dn} 65 dBA and EPA L_{dn} 55 dBA guidelines would be met at a radius of 100 feet and 645 feet, respectively.

Impacts Unique to Intermountain Water Supply Project

Long-term noise levels associated with the Intermountain Water Supply Project are predicted to meet Washoe County L_{dn} 65 dBA requirement at a 100-foot radius around the pump station and production wells operating on electrical power from distribution lines, and L_{dn} 65 dBA at 1,000 feet and EPA L_{dn} 55 dBA at 2,670 feet using diesel generators. For the two

production wells operating on electric power from distribution lines, Washoe County L_{dn} 65 dBA and EPA L_{dn} 55 dBA guidelines would be met at a radius of 100 feet and 645 feet, respectively.

ALTERNATIVE A – CONSTRUCT PIPELINES WITHIN COMMON RIGHT-OF-WAY

Under Alternative A, predicted construction and operational noise would be the same as for the Proposed Actions.

NO ACTION ALTERNATIVE

Common to Proposed Actions

Under the No Action Alternative, impacts from noise would not increase beyond current levels.

MONITORING AND MITIGATION MEASURES

Measures Common to Proposed Actions

The following mitigation measures could be implemented to reduce or eliminate effects of noise on humans and wildlife:

- Limit high-noise and blasting activities to daytime hours.
- Install high-grade mufflers on diesel-powered equipment and generators (Intermountain Water Supply Project only).
- Combine noisy operations to occur for short durations during the same time period.
- Minimize or eliminate night time construction and operation activities.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Common to Proposed Actions

No resources would be irreversibly or irretrievably impacted by noise generated from the proposed Projects.

RESIDUAL EFFECTS

Effects Common to Proposed Actions

No residual effects on the environment from noise generated during the course of construction and operation of the proposed Projects have been identified.

VISUAL RESOURCES

SUMMARY

Color and texture of reclaimed areas would result in minimal contrast to the existing landscape. Disturbed areas associated with construction activity would contrast with undisturbed areas during periods of construction. Mitigation would include shaping edges and revegetation of disturbed areas to blend with natural occurring land forms and vegetation. After completion of mitigating measures, VRM Class IV objectives would be met.

New structures associated with pump stations and storage tanks would introduce moderate visual impacts of geometric shapes into a landscape of rolling hills.

DIRECT AND INDIRECT IMPACTS

PROPOSED ACTION

Impacts Common to Proposed Actions

New structures associated with pump stations and storage tanks would introduce moderate visual impacts of geometric shapes into a landscape of rolling hills. Installation of proposed water transmission pipelines would have a temporary visual impact while under construction.

Color and texture of reclaimed areas would result in minimal contrast to the existing landscape. Disturbed areas associated with construction activity would contrast with undisturbed areas during periods of construction. Mitigation would include shaping edges and revegetation of disturbed areas to blend with natural occurring land forms and vegetation. After completion of mitigating measures, VRM Class IV objectives would be met.

Impacts Unique to Fish Springs Ranch Project

The proposed Fish Springs Ranch water transmission pipeline would have a temporary visual impact while under construction. In southeastern Honey Lake Valley, an electrical substation, overhead electrical powerlines, pump station, and storage tanks would result in a moderate visual impact (see key observation point (KOP-1) on **Figure 4-4**). The proposed terminal water storage tank at the end of the Fish Springs Ranch pipeline would be located adjacent to Matterhorn Boulevard near the drainage divide between Antelope Valley and Lemmon Valley (see KOP-2 on **Figure 4-4**). KOP-2 would have the highest number of potential viewing minutes between the two KOPs; however, the view would be relatively short duration because viewers would be associated with traffic going over the divide.

Impacts Unique to Intermountain Water Supply Project

The proposed Intermountain Water Supply pipeline would have a temporary visual impact while under construction. Production wells, pump station, and storage tanks in Dry Valley and Bedell Flat would have a moderate visual impact (see KOP-3 in Bedell Flat on **Figure 4-5**). A terminal water storage tank is not included in the Proposed Action for Intermountain Water Supply.

ALTERNATIVE A – CONSTRUCT PIPELINES WITHIN COMMON RIGHT-OF-WAY

Implementation of Alternative A would would result in minimal reduction in visual impacts associated with installation of water transmission pipelines as compared to the Proposed Actions. Temporary visual impacts associated with pipeline construction would be reduced slightly for Alternative A because the disturbance area would be less than for the Proposed Actions.

NO ACTION ALTERNATIVE

Common to Proposed Actions

Under the No Action Alternative, no visual impacts would occur beyond those already present in southeastern Honey Lake Valley, Dry Valley, Bedell Flat, Antelope Valley, and Lemmon Valley.

MONITORING AND MITIGATION MEASURES

Measures Common to Proposed Actions

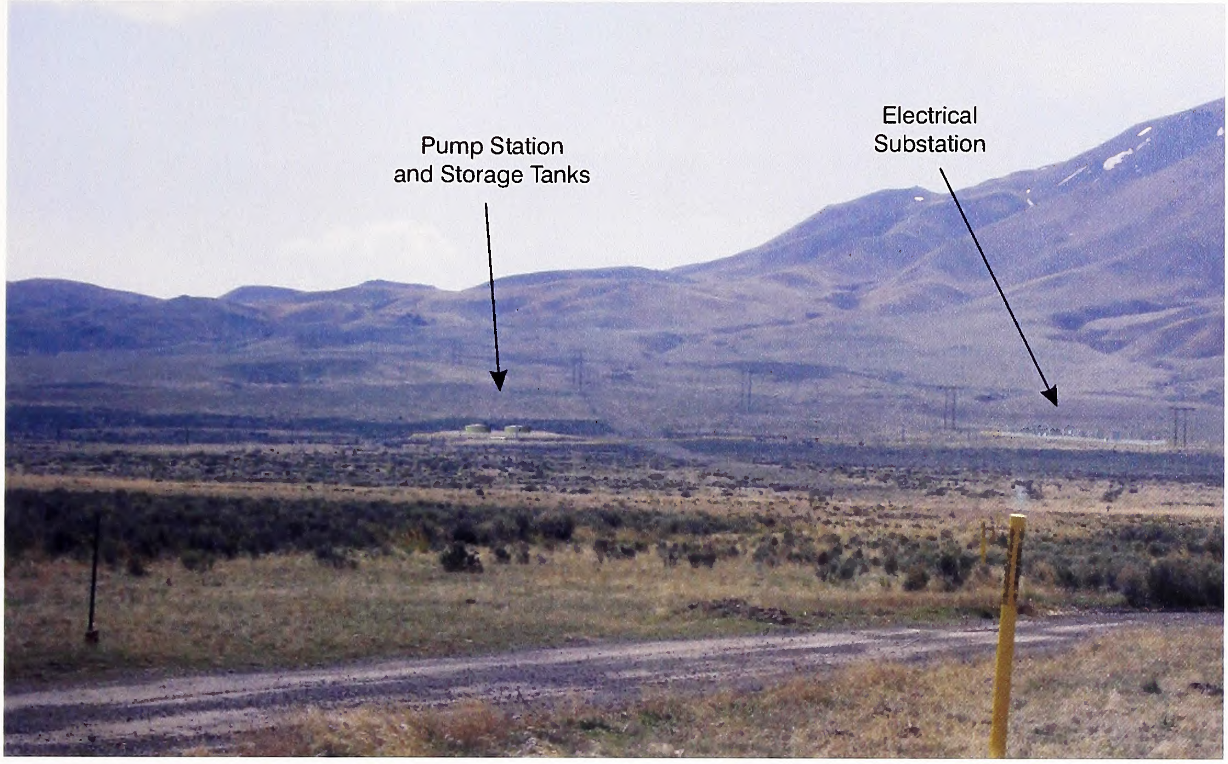
Mitigation measures have been developed to minimize visual impacts. The objective is to reduce visual contrasts based on three concepts: (1) siting facilities in less visible areas; (2) minimizing disturbance; and (3) repeating basic elements of form, line, color, and texture. The following measures would be applied to minimize visual impacts of the Proposed Actions:

- Establish clearly defined construction limits that incorporate irregular shapes to reflect existing forms and patterns.

- Plan revegetation so colors and textures blend with undisturbed land.

- Minimize visual contrast of structures with natural forms by using colors that blend with the land; use finishes that have low levels of reflectivity.

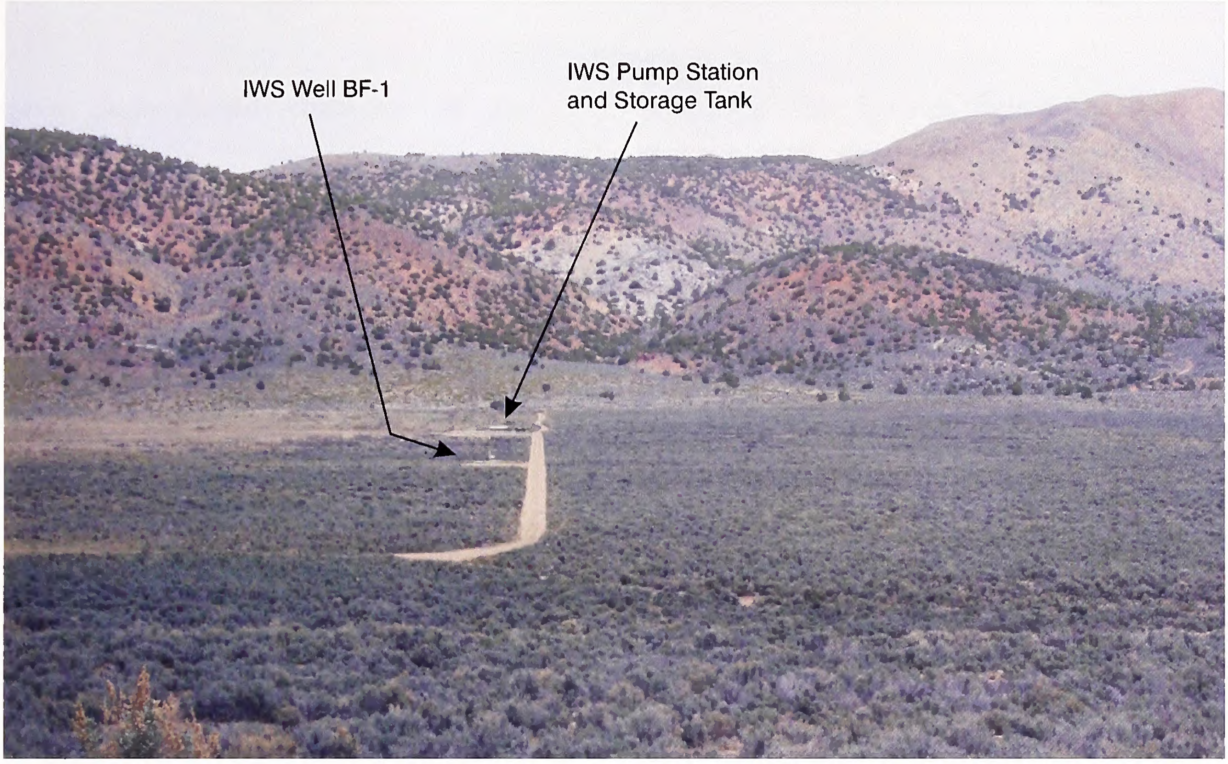
- Paint structures a slightly darker color than the surrounding landscape to compensate for the effects of shade and shadow.



KOP-1 View from Fish Springs Ranch Road looking south.

KOP-2 View from highest point on Matterhorn Boulevard looking east.

KOPs 1 and 2
North Valleys Rights-of-Way Projects EIS
Reno, Nevada
FIGURE 4-4



KOP-3 View from Bedell Flat Road looking east across valley.

See Figure 3-8 for Location of Key Observation Points (KOPs)

IWS = Intermountain Water Supply

KOP 3 Post Construction
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
FIGURE 4-5

- Preserve undeveloped character of the landscape.
- Investigate other terminal tank sites that would be less visible.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Common to Proposed Actions

No irreversible or irretrievable commitment of visual resources has been identified as a result of implementation of the Proposed Actions.

RESIDUAL EFFECTS

Fish Springs Ranch Project

Following successful reclamation along the water transmission pipeline corridors, the proposed Fish Springs Ranch terminal water storage tank would be the most noticeable residual effect of the Proposed Action. Pump stations and wellheads would also have smaller residual effect on visual resources. Weak contrasts in form, line and color could remain assuming these structures would not be removed. Implementation of mitigation measures would further reduce visual impacts from these facilities.

Intermountain Water Supply Project

Residual effects of the pump station, storage tanks, and wellhead structures in Dry Valley and Bedell Flat would be the most noticeable residual effect of the Proposed Action. Weak contrasts in form, line and color could remain assuming these structures would not be removed. Implementation of mitigation measures would further reduce visual impacts from these facilities.

SOCIAL AND ECONOMIC RESOURCES

SUMMARY

The Proposed Actions would affect social and economic resources by increasing the level of economic activity in Washoe County during construction of the Projects. These effects are expected to be beneficial because the Proposed Actions would increase spending and income levels in the area by providing jobs. The Proposed Actions would deliver water to the North Valleys Planning Area, thereby allowing development of approved land uses which have not been allowed to develop because of the lack of a municipal water supply.

DIRECT AND INDIRECT IMPACTS

Impacts Common to Proposed Actions

The Proposed Actions would increase economic activity within Washoe County during the construction periods. Construction workforces would be comprised of skilled laborers, such as carpenters, brick layers, millwrights, iron workers, sheet metal workers, painters, electricians, and plumbers/pipe layers.

Construction jobs would be filled by workers already residing in the area and by workers from outside Washoe County who would fill new jobs. Even if all 220 workers (combined construction work force estimated for both Projects) relocated to Washoe County from somewhere else, Washoe County has the community infrastructure to accommodate them without any socioeconomic impacts. In 2000, over 900 rental units were vacant and available to house construction workers. Construction of the proposed Projects would result in temporary jobs for up to one year and is not expected to result in a permanent increase in the population, employment, or spending within the area. Effects on the workforce would be minimal; therefore, overall project-induced direct and indirect effects on the Washoe County economy are also expected to be minimal and beneficial.

Nevada does not tax personal income in-state; however, construction supplies and materials would be taxed at 7.375 percent with 2.5 percent going to the county general fund and another 0.625 percent going to special county projects. The remainder of the revenue would go to local school districts or would stay in the state general fund. Privately owned pipeline and ancillary facilities would be subject to county property tax at an average rate in the unincorporated area of Washoe County of $3.17 per $100 of assessed valuation on the leasehold interest.

The Proposed Actions would have no direct impact on growth in Washoe County, with the exception of requiring local government to review and decide on developments and master plan amendments made possible by the provision of a water supply. An indirect impact would result from development of areas with residential, commercial, and industrial land uses in the North Valleys Planning Area that have not been developed because of lack of water. In addition, Project proponents would have to obtain special use permits from Washoe County for the pipeline(s) and pumping station(s) after this EIS is complete and before a Record of Decision (ROD) is issued (Whitney 2005).

The Proposed Actions are responding to the existing and future water needs of the North Valleys Planning Area. These needs are based on land use plans and designations prepared by the Washoe County Department of Community Development, which depict the planned growth.

The North Valleys Area Plan (Washoe County Department of Community Development 2004) presents planned land use designations; ultimate build-out potential of existing vacant parcels in the planning area is approximately 23,200 houses, which implies a population of over 68,100 at the population per household (PPH) of 2.7 persons and an occupancy rate of 95.2

percent, (average PPH and occupancy rates found in Census Tracts 26.03 – 26.06, the main tracks in the North Valleys Planning Area) (Giesinger 2004). No time frame has been identified for ultimate build-out since subdivisions cannot be approved without providing an adequate supply of water. All groundwater in the North Valleys Planning Area is currently appropriated. Washoe County has adopted a policy that requires adequate water rights as a condition of approval of any subdivision in the planning area (Washoe County Department of Community Development 2004).

Growth would increase the demand on infrastructure and community services in the North Valleys Planning Area. Primary governmental services include the following:

Water Service

The North Valleys Area Plan identifies a residential water demand of 250 gallons per day/per person as a quality of life indicator but uses 210 gallons per day/per person (0.24 acre feet per year) for planning purposes (Washoe County Department of Community Development 2004). Impacts that may arise from delivery of water via the Proposed Actions would be addressed by local government units in the planning processes. If both projects move forward, 11,500 acre feet of water would be delivered to the North Valleys Planning Area, providing water for approximately 47,800 people or approximately 16,800 new dwelling units (given the PPH and vacancy rate assumed above).

Sanitary Sewer Service

Development within the Reno-Stead Corridor Joint Planning area would require expansion of existing wastewater treatment facilities. Residential development in the area must meet County standards requiring a sanitary sewage system capable of handling a minimum of 325 gallons per day/per dwelling unit (Washoe County Department of Community Development 2004).

Fire Protection

Current fire protection facilities should be adequate to support anticipated growth in the area (Washoe County Department of Community Development 2004).

Police Protection

As development occurs in the North Valleys Planning Area, patrols would need to be increased (Washoe County Department of Community Development 2004).

Schools

New schools would be needed as development occurs. The service standard for schools in the North Valleys Planning Area requires that schools be located within a 15-minute one-way or less travel time for elementary school students, a 25-minute one-way travel or less for middle school students, and a 35-minute one-way travel time for high school students (Washoe County Department of Community Development 2004).

Parks and Recreation Facilities

Washoe County park standards require 7 acres per 1,000 population. As new residential development occurs, land and/or money to develop parks would be set aside for that area (Washoe County Department of Community Development 2004).

The value of existing homes in the North Valleys Planning Area would likely increase with availability to municipal water lines from increased water supply. Long-term housing values would increase because of increased reliability associated with the new water source and delivery system. Currently, vacant and developable land would increase in value depending on development potential of the land, (i.e., the number of new units allowed by zoning and development standards already in place). Assessing actual property value increase or decrease, if any, would require a formal appraisal or property value study. Property tax revenues from increased home values and new residential and related commercial development would increase as a result of the Proposed Actions.

Impacts Unique to Fish Springs Ranch Project

Approximately 160 workers would be required to construct the Fish Springs Ranch proposed pipeline and associated structures. Construction of the pipeline would require approximately 11 months to complete (ECO:LOGIC 2004). Construction work force associated with the Fish Springs Ranch Project would represent an increase of 1 percent over the 17,607 workers in Washoe County construction work force in 2000.

Construction costs for the Fish Springs Ranch Project is estimated at $55 million (in 2004 dollars), which includes labor, materials, and services associated with construction of wells and well buildings, pump station, pipelines, tanks, and an electrical substation.

Up to 8,000 acre-feet of water would be supplied annually through the Fish Springs Ranch Proposed Action. Based on the per capita use described above (0.24 acre feet per person per year), the Fish Springs Ranch Project would supply water for approximately 33,300 people.

Impacts Unique to Intermountain Water Supply Project

Approximately 60 workers would be employed during construction of the Intermountain Water Supply Project. Construction and development are estimated to require approximately 10 to 12 months to complete. The construction work force for water transmission pipeline and ancillary facilities associated with the Intermountain Water Supply Project would represent a 0.2 percent increase over the 17,607 workers in Washoe County construction work force in 2000. Construction cost for the Intermountain Water Supply Project is estimated at $11.42 million (in 2004 dollars).

The Intermountain Water Supply Project would provide 3,500 acre feet of water annually. Based on the per capita use described above (0.24 acre feet per person per year), the

Intermountain Water Supply Project could supply water for approximately 14,500 people.

ALTERNATIVE A - CONSTRUCT PIPELINES WITHIN COMMON RIGHT-OF-WAY

Alternative A would involve Fish Springs Ranch and Intermountain Water Supply using a common 130-foot wide construction right-of-way for the respective pipelines. Potential impacts on social and economic resources, including growth and property values, are expected to be similar to impacts described under the Proposed Actions.

NO ACTION ALTERNATIVE

Common to Proposed Actions

Under the No Action Alternative, beneficial effects on the economy would not occur. Development potential identified in the North Valleys Planning Area would not occur unless an alternate source of water was secured or Washoe County policy requiring an adequate water supply from other sources was changed. Existing home values may increase faster than other areas of the county if the area becomes "exclusive" because other development, potentially at higher densities, is not allowed. At present, vacant and developable land has little real value because the lack of water prevents them from being developed.

No Action for Fish Springs Ranch Project

In addition to the loss of construction labor revenue and expenditure of money to purchase materials for use in developing the proposed Project, implementation of the No Action Alternative would eliminate transport of approximately 8,000 acre-feet of water via pipeline annually across public land to the North Valleys Planning Area. Groundwater withdrawals at Fish Springs Ranch, however, may continue for irrigation or other purposes in eastern Honey Lake Valley.

No Action for Intermountain Water Supply Project

In addition to loss of construction labor revenue and expenditure of money to purchase materials for use in developing the proposed Project, implementation of the No Action Alternative would eliminate transport of approximately 3,500 acre-feet of water via pipeline annually across public land to the North Valleys Planning Area.

MONITORING AND MITIGATION MEASURES

Measures Common to Proposed Actions

No mitigation or monitoring measures have been identified by BLM to reduce impacts to social and economic resources associated with the Proposed Actions.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Common to Proposed Actions

No irreversible and irretrievable commitment of social and economic resources has been identified associated with the Proposed Actions and Alternatives.

RESIDUAL EFFECTS

Effects Common to Proposed Actions

No residual impacts to social and economic resources have been identified as a result of the Proposed Actions and Alternatives.

CULTURAL RESOURCES

SUMMARY

Two National Register eligible properties are present in areas common to the Proposed Actions. Both properties were treated during the Tuscarora Pipeline Project and no further action would be required at these properties in advance of either Proposed Action. Previously unevaluated sites are not present in the Area of Potential Effect (APE) common to both Proposed Actions.

Six National Register eligible properties are located within the APE unique to the Fish Springs Ranch Proposed Action. These sites have been recommended as eligible based on Criterion D. Treatment of the sites was limited to selected features or loci within the immediate Tuscarora Project right-of-way. Additional data recovery may be required at these properties in advance of the Fish Springs Ranch Proposed Action. Six sites located within portions of the APE unique to the Fish Springs Ranch Proposed Action and three sites located adjacent to the APE remain unevaluated or contain an unevaluated component. These sites would require additional review to determine eligibility for the National Register.

Two National Register eligible properties (based on Criterion D) are located within the APE unique to the Intermountain Water Supply Proposed Action. Four sites located within portions of the APE unique to the Intermountain Water Supply Proposed Action and four sites located adjacent to the APE remain unevaluated or contain an unevaluated component. These sites would require additional review to determine eligibility for the National Register.

DIRECT AND INDIRECT IMPACTS

Area of Potential Effect

Compliance with Section 106 of the National Historic Preservation Act requires definition of an area of potential effect (APE) specific to the proposed undertaking. Direct effects that would result in physical damage to properties and effects that might result in a diminished integrity of setting for properties located outside the area of direct effect were also considered.

Areas of direct effect would be associated with production well development, construction of pump stations, storage tanks and associated components. The inventory of APE associated with linear project elements was defined as a corridor extending 150 feet to either side of the staked centerline. The APE associated with point or location specific elements was defined as an area extending 100 feet beyond the defined construction limits. The APE for Fish Springs Ranch and Intermountain Water Supply Proposed Actions includes a 300-foot wide corridor tied to the centerline of proposed respective pipelines, and areas around point or location-specific elements that make up part of the Proposed Actions.

Some eligible properties located outside areas of direct effect may be subject to impact even though no surface disturbance is proposed. Properties deemed eligible based on National Register Criteria A through C may be affected due to introduction of new visual or audible elements. An archival Study Area extending 1 mile from the centerline of each Proposed Action was established to assess the potential for such effects. Previously identified National Register eligible properties located in those archival study areas were reviewed to determine if any would be subject to impacts that may affect their eligibility based on National Register Criteria A through C.

Impacts Common to Proposed Actions

Two National Register eligible properties (CrNV-31-4784 and -4789) are present in areas common to the Proposed Actions. Both sites have been recommended as eligible based on Criterion D. These properties were treated during the Tuscarora Pipeline Project and no further action would be required at these properties in advance of either Proposed Action. Previously unevaluated sites are not present in that portion of the APE common to both Proposed Actions. Based on these considerations, impacts to previously untreated National Register eligible properties would not occur within the APE common to both Proposed Actions.

Impacts Unique to Fish Springs Ranch Project

Six National Register eligible properties are located within the APE unique to the Fish Springs Ranch Project. They include CrNV-31-1775a, -4768, -4782, -4785 (historic and prehistoric components), -4798, -6026 (prehistoric component only), and –6027. These sites have been recommended as eligible based on Criterion D.

Three of the National Register eligible properties were subjected to some level of data recovery during the Tuscarora Pipeline Project.

One property (CrNV-31- 4768) was treated and no further action would be needed at that property in advance of the Fish Springs Ranch Proposed Action. Only a portion of properties CrNV-31-4782 and -4785 (historic and prehistoric components) has been treated. Treatment was limited to selected features or loci within the immediate Tuscarora Project right-of-way. Additional data recovery may be required at these properties in advance of the Fish Springs Ranch Proposed Action.

National Register eligible portions of CrNV-31-1775a were avoided during construction of the Tuscarora Pipeline Project. Measures should be taken to ensure that contributing features and loci not previously treated are avoided and protected during construction of the North Valleys Rights-of-Way Project. If contributing features and/or loci cannot be avoided and protected, then an appropriate level of treatment should occur prior to project construction.

Six sites (CrNV-31-5082, -5088, -6028, -6029, -6050, and -6051) located within portions of the APE unique to the Fish Springs Ranch Proposed Action remain unevaluated or contain an unevaluated component. These sites require additional review to determine eligibility for the National Register. An assessment of potential Project impacts to these sites cannot occur until National Register eligibility has been determined.

Eligibility of nine National Register sites located outside of, but within, one mile of Fish Springs Ranch Proposed Action APE is listed as undetermined. Of these, six are prehistoric period sites. If eligible, their significance most likely would be related to their potential to yield important information (Criterion D). As such, they would not be subject to potential impacts associated with the introduction of new visual or audible elements. The remaining three sites (CrNV-31-1661, -4554, and -4590) date to the historic period. One or more of these sites may be National Register eligible based on Criteria A through C. As a result, they may be subject to potential impacts associated with the introduction of new visual or audible elements. The National Register eligibility of these three sites must be determined before an assessment of potential Project impacts can occur.

Impacts Unique to Intermountain Water Supply Project

Two National Register eligible properties (CrNV-31-6039 and -6040 prehistoric components only) are located within the APE unique to the Intermountain Water Supply Proposed Action. These sites have been recommended as eligible based on Criterion D.

Four sites (CrNV-31-5781, -6032, -6033, -6036 [prehistoric component only]) located within portions of the APE unique to the Intermountain Water Supply Proposed Action remain unevaluated or contain an unevaluated component. These sites require additional review to determine eligibility for the National Register. An assessment of potential Project impacts to these sites cannot occur until National Register eligibility has been determined.

The National Register eligibility of five sites located outside of, but within, one mile of the Intermountain Water Supply Proposed Action APE is listed as undetermined. Of these, one is

a prehistoric period site. If eligible, significance would most likely relate to its potential to yield important information (Criterion D). As such, the site would not be subject to potential impacts associated with the introduction of new visual or audible elements. The remaining four sites (CrNV-31-1664, -1752, -4683, and -4687) date to the historic period or contain a component that dates to the historic period. One or more of these sites may be National Register eligible based on Criteria A through C. As a result, they may be subject to potential impacts associated with the introduction of new visual or audible elements. The National Register eligibility of these sites must be determined before an assessment of potential Project impacts can occur.

ALTERNATIVE A – CONSTRUCT PIPELINES WITHIN COMMON RIGHT-OF-WAY

Impacts associated with Alternative A would be similar in nature and extent as those described for the Proposed Actions.

NO ACTION ALTERNATIVE

There would be no direct effect on National Register eligible sites for either Proposed Action under the No Action Alternative.

MONITORING AND MITIGATION MEASURES

Measures Common to Proposed Actions

Impacts to previously untreated National Register eligible properties would not occur within the APE common to both Proposed Actions. Monitoring and mitigation measures would not be required in this area.

Measures Unique to Fish Springs Ranch Project

Direct and indirect impacts could occur to National Register eligible properties. The following mitigation measures are proposed to address impacts specific to the Fish Springs Ranch Proposed Action:

- **Encourage avoidance:** The Project proponent, in concert with BLM, shall make a reasonable effort to design the Project in such a manner as to avoid National Register eligible properties.

- **Address impacts to National Register properties located inside the APE:** Unless otherwise authorized by BLM no surface disturbance shall occur within or immediately adjacent (within 100 meters) to the boundary of National Register eligible properties CrNV-31-4798, -6026 (prehistoric component only), and -6027 prior to completion of the field phase of a data recovery plan that has been reviewed and approved by BLM in consultation with the Nevada State Historic Preservation Office.

- **Address the need for additional treatment at selected sites inside the APE:** Unless otherwise authorized by BLM no surface disturbance shall occur within or immediately adjacent (within 100 meters) to the boundary of National Register eligible properties CrNV-31-1775a, -4782

and -4785 prior to making a determination on whether additional treatment is required beyond that conducted on behalf of the Tuscarora Pipeline Project. If additional treatment is deemed necessary at one or both of the properties, no surface disturbance shall occur within or immediately adjacent (within 100 meters) to the boundary of the property prior to completion of the field phase of a data recovery plan that has been reviewed and approved by BLM in consultation with the Nevada State Historic Preservation Office.

- **Address the eligibility of unevaluated sites inside the APE:** Unless otherwise authorized by BLM no surface disturbance shall occur within or immediately adjacent (within 100 meters) to the boundary of sites CrNV-31-5082, -5088, -6028, -6029, -6050, and -6051 until their National Register eligibility has been determined. If one or more of these sites are determined to be National Register eligible no surface disturbance shall occur within or immediately adjacent (within 100 feet) to the boundary of sites prior to completion of the field phase of a data recovery plan that has been reviewed and approved by BLM in consultation with the Nevada State Historic Preservation Office.

- **Address the eligibility of unevaluated sites adjacent to the APE:** BLM would authorize work at sites CrNV-31-1661, -4554, and -4590 to determine National Register eligibility. If one or more of these sites are determined National Register eligible based on Criterion A, B, or C, then a data recovery plan shall be implemented that has been reviewed and approved by BLM in consultation with the Nevada State Historic Preservation Office.

Measures Unique to Intermountain Water Supply Project

Direct and indirect impacts could occur to National Register eligible properties. The following mitigation measures are proposed to address those impacts specific to the Intermountain Water Supply Proposed Action:

- **Encourage avoidance:** The Project proponent, in concert with BLM, shall make a reasonable effort to design the Project in such a manner as to avoid National Register eligible properties.

- **Address impacts to National Register properties located inside the APE:** Unless otherwise authorized by BLM no surface disturbance shall occur within or immediately adjacent (within 100 feet) to the boundary of National Register eligible properties CrNV-31-6039 and –6040 (prehistoric component only) prior to completion of the field phase of a data recovery plan that has been reviewed and approved by BLM in consultation with the Nevada State Historic Preservation Office.

- **Address the eligibility of unevaluated sites inside the APE:** Unless otherwise authorized by BLM no surface disturbance shall occur within or immediately adjacent (within 100 feet) to the boundary of sites CrNV-31-5781, -6032, -6033, and -6036 (prehistoric component only) until their National Register eligibility has been determined. If one or more of these sites

are determined eligible for the National Register no surface disturbance shall occur within or immediately adjacent (within 100 feet) to the boundary of sites prior to completion of the field phase of a data recovery plan that has been reviewed and approved by BLM in consultation with the Nevada State Historic Preservation Office.

- **Address the eligibility of unevaluated sites adjacent to the APE:** BLM would authorize work at sites CrNV-31-1664, -1752, 4683, and -4687 (historic component only) to determine eligibility for the National Register. If one or more of these sites are determined to be National Register eligible based on Criterion A, B, or C, then a data recovery plan shall be implemented that has been reviewed and approved by BLM in consultation with the Nevada State Historic Preservation Office.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Common to Proposed Actions

The Proposed Actions and other action Alternatives would result in loss of cultural resources that are not National Register eligible. Loss of these sites would constitute an irreversible and an irretrievable commitment of a resource. These sites have been recorded to current BLM standards and site information integrated into agency and statewide data repositories.

Impacts to National Register eligible properties would be reduced through preparation and implementation of data recovery plans. However, the information potential of impacted National Register eligible properties cannot be fully retrieved. As a result, post-treatment impacts to these properties as a result of the Proposed Actions would result in an irreversible and irretrievable commitment of a resource.

RESIDUAL EFFECTS

Effects Common to Proposed Actions

Data recovery activities could occur at National Register eligible properties. Even after implementation of data recovery activities, non-renewable resources would have been expended and is a residual effect of the Proposed Actions.

NATIVE AMERICAN RELIGIOUS CONCERNS/INDIAN TRUST RESPONSIBILITIES

SUMMARY

The Native American consultation process remains ongoing at this time. To date, concerns have not been identified for Native American traditional or religious uses of areas within the Fish Springs Ranch and Intermountain Water Supply proposed Projects. Based on preliminary findings, the Proposed Actions would have no direct or indirect impact on traditional or religious values located within the common areas, or areas unique to the respective Proposed Actions. The ongoing consultation process may result in identification of Native American Religious Concerns/Indian Trust Responsibilities, which will be reviewed and considered during preparation of the Final EIS and ROD.

DIRECT AND INDIRECT IMPACTS

Impacts Common to Proposed Actions

The Native American consultation process remains ongoing at this time. To date, neither Native American tribal groups nor individual Native Americans have expressed a concern regarding traditional or religious uses of areas common to the Fish Springs Ranch and Intermountain Water Supply proposed Projects. Based on these preliminary findings, the Proposed Actions would not appear to have a direct or indirect impact on traditional or religious values located within the common areas, areas unique to the respective Proposed Actions, tribal trust resources, trust assets, or tribal health and safety.

Some springs in the Study Area could be considered sacred sites by tribal members. Consultation is ongoing between BLM and the tribes. The ongoing consultation process may result in identification of Native American Religious Concerns/ Indian Trust Responsibilities, which will be reviewed and considered during preparation of the Final EIS and ROD.

ALTERNATIVE A – CONSTRUCT PIPELINES WITHIN COMMON RIGHT-OF-WAY

Impacts associated with Alternative A would be the same as those identified for the Proposed Actions.

NO ACTION ALTERNATIVE

Common to Proposed Actions

Under the No Action Alternative, no impacts would occur to Native American traditional or religious values within the Projects Area.

MONITORING AND MITIGATION MEASURES

Measures Common to Proposed Actions

In the absence of any identified impacts, monitoring and mitigation measures would not be required. However, the ongoing consultation process may result in identification of Native American Religious Concerns/Indian Trust Responsibilities, which will be reviewed and, as appropriate and necessary, monitoring and mitigation measures would be developed.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Common to Proposed Actions

Based on preliminary findings, it appears that the Proposed Actions would not impact Native American traditional or religious values. As a result, there would be no irreversible or irretrievable impacts. However, should the ongoing consultation process result in identification of Native American Religious Concerns/Indian Trust Responsibilities be considered an irreversible or irretrievable commitment of resources, they would be reviewed and considered during preparation of the Final EIS and ROD.

RESIDUAL EFFECTS

Effects Common to Proposed Actions

There would be no residual effects to Native American Religious Concerns/Indian Trust Responsibilities resulting from implementation of the Proposed Actions and Alternatives. The ongoing consultation process may result in identification of Native American Religious Concerns/Indian Trust Responsibilities regarding residual effects of the proposed Project, which would be reviewed and considered during preparation of the Final EIS and ROD.

ENVIRONMENTAL JUSTICE

SUMMARY

Potential direct and indirect impacts associated with the Proposed Actions or Alternative A would not have a disproportionate effect on minority populations. One low-income population has been identified in or near the Projects Area and would not receive a disproportionate impact from implementation of the Proposed Actions.

DIRECT AND INDIRECT IMPACTS

Impacts Common to Proposed Actions

The Reno-Sparks Indian Colony is identified as a minority and low-income population within the Study Area; however, no environmental effects are expected to disproportionately affect the Reno-Sparks Indian Colony or any other minority or low-income populations. There would be no effect on Environmental Justice values.

ALTERNATIVE A – CONSTRUCT PIPELINES WITHIN COMMON RIGHT-OF-WAY

Impacts associated with Alternative A would be the same as those identified for the Proposed Actions.

NO ACTION ALTERNATIVE

Common to Proposed Actions

Under the No Action Alternative, no impacts would occur to Environmental Justice values within the Projects Area.

MONITORING AND MITIGATION MEASURES

Measures Common to Proposed Actions

No environmental justice effects would occur, and no mitigation is necessary. The Environmental Justice impact analysis was prepared based on year 2000 census data because these were the only data available.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Common to Proposed Actions

Based on preliminary findings, it appears that the Proposed Actions would not impact Environmental Justice values. As a result, there would be no irreversible or irretrievable impacts.

RESIDUAL EFFECTS

Effects Common to Proposed Actions

There would be no residual effects to Environmental Justice concerns resulting from implementation of the Proposed Actions and Alternatives.

CUMULATIVE EFFECTS

INTRODUCTION

This section summarizes potential cumulative environmental impacts on resources in the North Valleys area that could result from the Proposed Actions. As stated in 40 CFR 1508.7, "…'cumulative impact' is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency [Federal or non-Federal] or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively *significant* actions taking place over a period of time…."

Cumulative effects are evaluated for those resources for which potential direct or indirect impacts have been identified earlier in this chapter. The cumulative effects analysis included in this section does not consider implementation of mitigation measures that may be required by BLM or other agencies that have jurisdiction over the proposed Projects. BLM has determined that the following resources would not be adversely affected by implementation of the Proposed Actions and are therefore not discussed in this section:

- Geology, Minerals and Paleontology;
- Access and Land Use;
- Recreation;
- Noise;
- Cultural Resources;
- Native American Religious Concerns/Indian Trust Responsibilities; and
- Environmental Justice.

The geographic area considered in analyzing cumulative effects varies depending on the resource being evaluated. **Figure 2-1** depicts the general area used to analyze potential cumulative effects associated with the Proposed Actions. Primary features of the cumulative effects area include areas within and proximal to: Honey Lake Valley, Dry Valley, and Bedell Flat that could be affected by groundwater drawdown resulting from proposed production wells; the corridor for proposed water transmission pipeline rights-of-way in Honey Lake Valley, Dry Valley, Bedell Flat, Antelope Valley, and Lemmon Valley; and the terminus area of final water storage and distribution in the Lemmon Valley/Stead area.

PAST AND PRESENT ACTIVITIES

Portions of the Projects Area have been authorized as utility corridors including the Tuscarora Natural Gas Pipeline and electrical power corridors for Sierra-Pacific Power Company. Livestock grazing and dispersed recreation activities have been and continue to be dominant land uses on public land within the proposed rights-of-way for the Projects.

REASONABLY FORESEEABLE FUTURE ACTIVITIES

LAND USE

Foreseeable activities within the rights-of-way corridor associated with the Proposed Actions include grazing, dispersed recreation, and increased off-highway vehicle use. Build-out of residential and commercial property within the North Valleys Planning Area would increase use of adjacent public land for these activities.

WATER WITHDRAWAL AND USE

Water Rights

Based on water rights applications on file with the Nevada State Engineer, foreseeable activities within the areas of groundwater withdrawal associated with the Proposed Actions include continued production of groundwater to supply water to meet demands in the North Valleys Planning Area for residential and commercial development and to meet agricultural and rural residential demand in Honey Lake and other areas of Washoe County.

The current change of use right maintained by Fish Springs Ranch that allows importation of water from eastern Honey Lake Valley to the North Valleys Planning Area specifies that up to 13,000 af/yr of water could be imported via the change in use designation. Fish Springs Ranch currently has rights to 14,146 af/yr assigned by the State Engineer to the previous owner of the Fish Springs Ranch. Although not proposed by Fish Springs Ranch, it is reasonably foreseeable that importation of water into the North Valleys Planning Area could increase to 13,000 af/yr at some point in the future.

Delivery of water in excess of the amount specified in the Proposed Actions could allow continued implementation of the Truckee Meadows Regional Plan. Construction of housing, community infrastructure, and use of water to reduce or offset current sources of water into the greater Reno/Sparks area could result from importation of additional water via the existing importation right or future authorizations from the State Engineer.

Proposed Granite Fox Power Plant

A notice of intent (NOI) to prepare an EIS has been filed by the BLM Winnemucca Field Office for the Granite Fox Power Plant project located north of Gerlach, Nevada. Granite Fox Power LLC's proposed 1,450 megawatt coal-fired power plant project would include securing water rights in the Smoke Creek Desert totaling 25,000 af/yr, of which the proposed power plant would use 16,000 af/yr. Withdrawal of this volume of groundwater from the Smoke Creek Desert may combine with predicted effects of groundwater pumping associated with the Fish Springs Ranch well system in eastern Honey Lake Valley to potentially impact groundwater resources in Smoke Creek Desert and recharge to Pyramid Lake Valley. To date, Granite Fox Power LLC has not secured the water rights, nor has the Nevada State Engineer granted a change in use from agriculture to industrial uses for water rights sought by Granite Fox Power.

Proposed Warm Springs Valley/ Winnemucca Valley to Lemmon Valley Water Pipeline Project

In July 1998, Intermountain Pipeline, Ltd. filed a preliminary draft application for a right-of-way to cross public land administered by the BLM Carson City Field Office. The right-of-way application was to allow construction of a water pipeline that would convey groundwater pumped from a well system in the Winnemucca and Warm Springs valley areas approximately 17 miles to Lemmon Valley. Agricultural use of the water would be retired and Intermountain Pipeline, Ltd. was seeking change of use and importation rights for the water source to provide water to Lemmon Valley from the State Engineer.

The preliminary right-of-way proposal included pumping rates totaling 2,900 af/yr for the well arrays located in Winnemucca Valley (Winnemucca Ranch and Marshall Ranch) and along Warm Springs Creek; conveyance of produced water via a 12-inch diameter pipeline for 17 miles to Lemmon Valley; installation of in-stream groundwater recharge areas; installation of a 24-acre off-channel recharge basin; and installation of three booster pump stations along the pipeline route. Pump stations would be powered by extension of overhead electrical distribution lines to each station.

Demand for sources of water to supply planned development in the North Valleys Planning Area is expected to continue into the future. No action has occurred on this application since the preliminary application was provided to BLM in 1998.

CUMULATIVE EFFECTS ON RESOURCES

AIR RESOURCES

The Washoe County air quality program monitors ambient $PM_{2.5}$, PM_{10}, CO, and ozone air quality at several locations. Monitoring data indicate effects of existing industrial, commercial, and governmental pollutant sources, as well as mobile emissions sources. Emissions associated with construction equipment and activities for the Proposed Actions would be temporary and are not expected to have lasting impacts on air quality in the region. These emissions could combine with other existing sources of air emissions within the region. If additional water rights are developed in the Projects Area, additional short-term air quality impacts could occur during construction activities. Construction and operation of the proposed Granite Fox Power Plant in the Smoke Creek Desert north of Gerlach, Nevada would represent a new long-term emission source in the region.

WATER RESOURCES

Proposed groundwater pumping of 8,000 af/yr in eastern Honey Lake Valley, 3,000 af/yr in western Dry Valley, and 500 af/yr in Bedell Flat could result in cumulative drawdown effects with other pumping in these basins, and possibly surrounding basins. Any increases in pumping in eastern Honey Lake Valley beyond the proposed withdrawals at Fish Springs Ranch, Smoke Creek Desert, or Pyramid Lake Valley could cumulatively add to groundwater drawdown in eastern Honey Lake Valley. Potential groundwater pumping rates of 16,000

af/yr associated with the proposed Granite Fox Power Plant in the Smoke Creek Desert north of Gerlach, Nevada could affect groundwater flow to adjacent valleys including Pyramid Lake Valley and Honey Lake Valley. It is uncertain at this time what effect the proposed power plant groundwater withdrawal could have on these adjacent areas; however, since the power plant would be located in excess of 50 miles north of Fish Springs Ranch eastern Honey Lake Valley well array and the divide between Smoke Creek Desert and Pyramid Lake Valley, BLM has determined that it is unlikely that groundwater withdrawal associated with the proposed power plant would combine to have an additive effect on groundwater flow in either basin.

Additional pumping in Dry Valley and Bedell Flat is not expected beyond the Proposed Actions, except possibly some domestic well pumping at relatively low rates in southern and western Bedell Flat. Substantial groundwater pumping in Long Valley proximal to Dry Valley, however, could result in cumulative drawdown in that area. Groundwater pumping in Warm Springs Valley also could have a cumulative effect on groundwater drawdown in the vicinity of eastern Dry Valley and Bedell Flat. Any cumulative groundwater drawdown in the area could result in additional adverse effects to springs, flowing wells, and associated wetland habitat.

SOIL RESOURCES

Impacts to soil from construction of the proposed Projects would include loss of soil productivity due to changes in soil structure from mixing and handling, decreased vegetative cover, water and wind driven soil loss, and compaction from roads, construction, and livestock grazing. These effects are localized near the construction sites. Reclamation associated with construction disturbance and future restoration activities would ameliorate soil loss and productivity loss. Soil salvaged and used in reclamation would become viable once vegetation is established.

If additional groundwater pumping projects are developed in the Projects Area, similar localized construction-related effects on soil resources would occur. Other activities within the Study Area that impact soil resources include OHV, roads, and grazing. These activities also have localized impacts on soil resources and do not contribute to soil losses on a watershed scale. If the proposed Granite Fox Power Plant is constructed in Smoke Creek Desert, the distance of about 50 miles separating the power plant site from the North Valleys area would preclude any cumulative soil effects. No other major land disturbing activities have been identified within the Study Area.

VEGETATION

Cumulative effects on vegetation would result from wildfire, livestock grazing, and trampling. Locally and regionally, wildfires have reduced the density of shrubs and trees sensitive to fire (e.g., sagebrush, bitterbrush, and juniper). Fires have resulted in replacement of shrub communities by grass-dominated communities, often with a component of the invasive species cheatgrass brome. Heavy livestock grazing and trampling have adversely affected the vigor and productivity of grasses and forbs, resulting in proliferation of noxious weeds and other species of low-forage value for livestock and wildlife.

Construction of the Tuscarora Natural Gas Pipeline and Sierra Pacific transmission line has altered natural vegetation in areas adjacent to the Proposed Projects. Noxious weeds have increased in some areas disturbed by past pipeline and transmission line construction. These cumulative effects have substantially altered the composition, density, and spatial distribution of native plant communities. Similar effects would occur in the vicinity of the proposed Granite Fox Power Plant if it is constructed near the town of Gerlach, Nevada in Smoke Creek Desert, approximately 50 miles from the North Valleys Planning Area. The Proposed Actions would incrementally add to this reduction in plant community productivity and diversity and could lead to the proliferation of noxious weeds and other invasive species.

Proposed groundwater pumping of 8,000 af/yr in eastern Honey Lake Valley, 3,000 af/yr in western Dry Valley, and 500 af/yr in Bedell Flat could result in cumulative drawdown effects with other pumping in these or other adjacent basins. This could occur if additional pumping occurs in Honey Lake Valley beyond the proposed 8,000 af/yr at Fish Springs Ranch, or if additional pumping occurs in other adjacent basins, such as Warm Springs Valley. As a result, additional adverse impacts may occur to wetland habitat from reduced flow at springs and/or flowing wells. Additional pumping in Dry Valley and Bedell Flat is not expected beyond the Proposed Actions, except possibly some domestic well pumping at relatively low rates in southern and western Bedell Flat.

WILDLIFE RESOURCES

Effects to wildlife would result from the Proposed Actions, acting cumulatively with wildfire, livestock grazing and trampling, and past construction of the Tuscarora Pipeline and Sierra Pacific Transmission Line. Similar effects could occur in the vicinity of the proposed Granite Fox Power Plant if it is constructed near the town of Gerlach, Nevada in Smoke Creek Desert, approximately 50 miles from the North Valleys Planning Area. These factors would cumulatively reduce the amount of forage and cover available to wildlife resulting in decreased capacity of the Projects Area and adjacent areas to support some wildlife species, especially those closely associated with sagebrush and juniper habitats (i.e., pygmy rabbit, sage grouse, mule deer, and pronghorn antelope).

Proposed groundwater pumping of 8,000 af/yr in eastern Honey Lake Valley, 3,000 af/yr in western Dry Valley, and 500 af/yr in Bedell Flat could result in cumulative drawdown effects with other pumping in these and adjacent basins. This could occur if additional pumping occurs in Honey Lake Valley beyond the proposed 8,000 af/yr at Fish Springs Ranch, or if additional pumping occurs in other adjacent basins.

Based on model results for groundwater pumping as described in Intermountain Water Supply's Proposed Action for Bedell Flat, groundwater flow in adjacent valleys including Warm Springs Valley and Winnemucca Valley could be reduced by approximately 3 percent of the total recharge available to these valleys.

Proposed pumping in Dry Valley also could affect groundwater flow by an unknown amount in Winnemucca Valley.

Implementation of the proposed groundwater pumping project (Intermountain Pipeline, Ltd. 1998) for the Warm Springs Valley and Winnemucca Valley could combine with existing pumping in these valleys and pumping associated with the Proposed Action in Dry Valley and Bedell Flat to reduce flow in surface water features in these valleys. This combination of pumping effects could impact known Carson wandering skipper habitat in Winnemucca Valley by reducing water flow in springs and seeps that support this habitat as well as habitat for waterfowl, shorebirds, and bats.

Groundwater drawdown predictions have not been compiled for the proposed Warm Springs Valley/Winnemucca Valley pipeline project because this proposed right-of-way application has not been advanced since 1998. Should there be renewed interest in developing this source of water for importation into the Lemmon Valley area, additional investigation should be completed to evaluate potential impacts to Carson wandering skipper habitat in these areas.

VISUAL RESOURCES

Cumulative effects to visual resources would include continued presence of roads in the Projects Area and pump stations, storage tanks, and electrical substation. Construction of other water pumping projects in Honey Lake Valley or other nearby basins, and/or the proposed Granite Fox Power Plant in Smoke Creek Desert, would also contribute to cumulative visual effects in the region. These features would continue to disrupt natural visual elements.

SOCIAL AND ECONOMIC RESOURCES

The projected total population that could be served through implementation of the proposed Projects would be approximately 68,500, the number of residents projected by the Washoe County Community Development office at full build-out in the North Valleys Planning Area if all the water was used for residential purposes. However, the Reno-Stead Airport Master Development Plan projects an ultimate water need of approximately 3,000 af/yr to achieve current development plans including domestic and landscaping requirements. Purveyors would determine which customers are able to obtain the water necessary to fulfill planned development.

Increasing the amount of water pumped and delivered up to the importation right of 13,000 af/yr from the eastern Honey Lake area diversion point to the North Valleys Planning Area would allow an additional 20,800 people to be served, thereby allowing full build-out in the North Valleys Planning Area if all water were used for residential purposes.

If the proposed Granite Fox Power Plant were constructed near the town of Gerlach, Nevada approximately 50 miles from the North Valleys Planning Area, cumulative social and economic effects could occur from its construction and operation.

CHAPTER 5

CONSULTATION, COORDINATION, AND PREPARATION

PUBLIC PARTICIPATION SUMMARY

Public participation specific to the North Valleys Rights-of-Way Projects is summarized in this chapter. The summary indicates how the public has been involved, identifies persons and organizations to be contacted for feedback, and specifies time-frames for accomplishing goals in accordance with 40 CFR 1506.6.

Public involvement in the EIS process includes the steps necessary to identify and address public concerns and needs. The public involvement process assists agencies in: (1) broadening the information base for decision making; (2) informing the public about Proposed Actions and potential long-term impacts that could result from the Projects; and (3) ensuring that public needs are understood by the agencies.

Public participation in the EIS process is required by NEPA at four specific points: scoping period, review of Draft EIS, review of Final EIS, and receipt of the Records of Decision.

- **Scoping:** The public is provided a 30-day scoping period to disclose potential issues and concerns associated with the Proposed Action. Information obtained by the agencies during public scoping is combined with issues identified by the agencies and this forms the scope of the EIS.

- **Draft EIS Review:** A 60-day Draft EIS review period is initiated by publication of Notice of Availability for the Draft EIS in the Federal Register. A public meeting will be held in Reno, Nevada during the 60-day comment period.

- **Final EIS Review:** A 30-day Final EIS review period is initiated by publication of Notice of Availability for the Final EIS in the Federal Register.

- **Records of Decision:** Subsequent to the 30-day review period for the Final EIS, Records of Decision (one for each Proposed Action) would be prepared.

IMPLEMENTATION

The public participation process for the North Valleys Rights-of-Way Projects EIS is comprised of the following four components:

1. PUBLIC SCOPING PERIOD AND MEETINGS

Publication of a Notice of Intent (NOI) initiated a public scoping period on September 15, 2003. The NOI summarized the Proposed Actions and a determination by BLM that an EIS would be necessary for analysis of the Fish Springs Ranch and Intermountain Water Supply proposals. The news media and public were notified of the public comment period. The public scoping period ended on January 31, 2004.

Scoping letters were mailed to individuals and organizations announcing the scoping period and describing Proposed Actions. Issues that

had been identified by BLM also were included in the mailing.

BLM held open house and public presentations on eight occasions between October 2, 2003 and January 7, 2004. Scoping comments were received from seventeen individuals and organizations. Concurrent with these actions, BLM issued a news release to local news organizations and radio stations with coverage in the surrounding geographical regions.

2. DISTRIBUTION OF DRAFT EIS

The Draft EIS will be distributed as follows:

- A Notice of Availability will be published in the Federal Register specifying dates for the comment period and the date, time, and location of a public meeting.
- A news release provided to all area media by BLM at the beginning of the 60-day comment period on the Draft EIS.
- The Draft EIS will be distributed to interested parties identified in the updated EIS mailing list.
- The Draft EIS will be posted on the BLM Carson City Field Office website.
- A public open-house meeting will be held in Reno, Nevada to obtain comments on the Draft EIS and answer questions that the public has regarding the Projects or the EIS process.

3. DISTRIBUTION OF FINAL EIS

The Final EIS will be distributed as follows:

- Notice of Availability will be published in the Federal Register.
- Copies of the Final EIS or Summary EIS will be sent to addresses on the mailing list.
- The Final EIS will be posted on the BLM Carson City Field Office website.
- A news release issued to the same news outlets used for previous project announcements.

4. RECORDS OF DECISION

A Record of Decision will be distributed by BLM for each of the two Proposed Actions to individuals and organizations identified on the updated Project mailing list. A news release will be provided to the news media.

CRITERIA AND METHODS BY WHICH PUBLIC INPUT IS EVALUATED

Letters and oral comments received by BLM on the Draft EIS will be reviewed and evaluated by the agency to determine if information provided in the comments would require a formal response or contains new data that may identify deficiencies in the EIS. Steps will then be initiated to correct such deficiencies and to incorporate information into the Final EIS.

CONSULTATION WITH OTHERS

In addition to the cooperating agencies identified in Chapter 1, the following state and federal agencies were consulted during preparation of the EIS:

- Nevada Department of Conservation and Natural Resources
- Nevada Department of Human Resources
- Nevada State Clearinghouse

LIST OF PREPARERS AND REVIEWERS

LEAD AGENCY – BUREAU OF LAND MANAGEMENT

CORE INTERDISCIPLINARY TEAM AND TECHNICAL SPECIALTY

Carson City Field Office Manager – Donald T. Hicks
EIS Project Team Leader – Terri Knutson
EIS Project Assistant Leader – Ken Nelson
NEPA Compliance – Terri Knutson
Geology & Minerals/Paleontology – Carla James
Recreation and Visual Resources –Terry Knight
Wildlife/Special Status Species – Walt Devaurs
Water Resources – Gabriel Venegas
Soil – Jim deLaureal
Hazardous Materials – Terry Neumann
Air Quality/Aesthetics (Visual & Noise Resources) – Terri Knutson
Vegetation/Range Resources – Russ Suminski
Access and Land Use – Ken Nelson
Cultural Resources/Native American Religious Concerns – Margaret Waski
Socioeconomics, Indian Trust Responsibilities – Tom Crawford
Environmental Justice – Terri Knutson

FISH SPRINGS RANCH, LLC

Don Pattalock, Vidler Water Company
Mike Baughman, Intertech Services Corporation
John Enloe, ECO:LOGIC Consulting Engineers

INTERMOUNTAIN WATER SUPPLY, LTD.

Robert W. Marshall, Principal
Richard F. DeLong, Enviroscientists, Inc.

THIRD PARTY EIS CONTRACTOR AND SUBCONTRACTORS

Maxim Technologies

Project Manager	Terry Grotbo Director/ Mine Services Helena, MT	BS Earth Science/Geology 23 years experience
Assistant Project Manager	Joe Murphy Helena, MT	BA Geography 33 years experience
Water Resources	Doug Rogness Helena, MT	B.S. Geology M.S. Hydrology 24 years experience

Physical Sciences	Doug Rogness Helena, MT	B.S. Geology M.S. Hydrology 24 years experience
Geology and Minerals	Allan Kirk Bozeman, MT	M.S. Geology 31 years experience
Social Sciences	Joe Murphy Helena, MT	BA Geography 33 years experience
Visual Resource	Mitchell Paulson Missoula, MT	A.D. Commercial Art 28 years experience
Social Economic Resources	Karen Lyncoln	B.A. Urban Studies 35 years experience
Document Control	Bonnie Johnson	30 years experience

Subcontractors

Big Sky Acoustics	Sean Connolly Helena, MT	B.S. Mechanical Engineering M.S. Mechanical Engineering 11 years experience
Lorenzen Engineering Air Resources	Diane Lorenzen, P.E. Helena, MT	B.S. Civil Engineering M.S. Environmental Engineering 20 years experience
Wildlife Resources	Joe Elliott Missoula, MT	B.S. Biology and Chemistry Ph. D. Botany 35 years experience
Geoarch Cultural/ Native American/ Environmental Justice	Charles D. Zeier Carson City, NV	B.S. Sociology/Anthropology M.A. Anthropology 28 years experience
WESTECH Environmental Services Vegetation/Springs/Seeps/ Special Status Plants/WUS	Lisa Larsen Helena, MT	B.S. Botany 30 years experience

MAILING LIST – NORTH VALLEYS RIGHTS-OF-WAY PROJECTS

This document was mailed to approximately 100 agencies and individuals.

CHAPTER 6
REFERENCES

Angus, I. No Date. Toll Roads of Nevada. Manuscript on file, Nevada State Historical Society, Reno.

Bailey, R. 1995. Description of the ecoregions of the United States.

Barrett, S. 1917. The Washoe Indians. *Bulletin of the Public Museum of the City of Milwaukee* 2(1):1-52.

Berger, D., D. Ponce and W. Ross. 2001. Hydrogeologic Framework of Antelope Valley and Bedell Flat, Washoe County, West-Central Nevada. U.S. Geological Survey, Water Resources Investigations Report 01-4220.

Berger, D.L., D. K. Maurer, T.J. Lopes, and K.J. Halford. 2004. Estimates of Natural Ground-Water Discharge and Characterization of Water Quality in Dry Valley, Washoe County, West-Central Nevada, 2002-2003. U.S. Geological Survey, Scientific Investigations Report 2004-5155. Prepared in cooperation with Washoe County.

Bohm, B. 1990. Isotope Hydrology of Southern Honey Lake Valley, Nevada and California. Plumas Geo-Hydrology. Prepared for Washoe County Department of Public Works, Reno, Nevada. August 30, 1990.

______**1991.** Effects of Pumping on Ground Water Quality in the Fish Springs Aquifer System, Southeastern Honey Lake Valley, Nevada. Plumas Geo-Hydrology. Prepared for Western Water Development Company, Inc., Reno, Nevada. June 30, 1991.

Bommer, A. and R. Bruce. 1996. The Current Level of Understanding into the Impacts of Energy Industry Noise on Wildlife and Domestic Animals. Collaboration in Science and Technology (CST), Inc. Proceedings of Spring Environmental Noise Conference, Innovations in Noise Control for the Energy Industry. The 1996 Conference on Environmental Noise Control Engineering. Banff, Alberta, Canada. April 14-16, 1996.

Bonham, H. F. 1969. Geology and Mineral Resources of Washoe and Storey Counties, Nevada. Nevada Bureau of Mines and Geology Bulletin 70, p. 140.

Brussard, P., B. Niell, and G. Austin. 1999. Report on the Distribution, Genetics, and Conservation of the Carson Wandering Skipper (Pseudocopaeodes eunus obscurus). Unpublished Report to the Nevada Department of Transportaion. University of Nevada, Reno.

Butts, T. 2004. Emigrant Mine Biological Report – Bats. Unpublished Report. Continental Divide Ecological Consulting. Helena, Montana.

California Department of Water Resources (DWR). 2004. North Lahontan Hydrologic Region (6), Honey Lake Valley Groundwater Basin. California Groundwater Bulletin 118. February.

______**2005.** North Lahontan Hydrologic Region (6), Honey Lake Valley Groundwater Basin. Water Plan Update Bulletin 160-05.

Clark, T. and M. Stromberg. 1987. Mammals in Wyoming. University of Kansas, Museum of Natural History. Public Education Series No. 10.

d'Azevedo, W. 1956. Washoe Place Names. Manuscript on file at the Department of Anthropology, University of Nevada, Reno.

______**1963.** The Washoe Indians of California and Nevada. *University of Utah Anthropological Paper* 67, Salt Lake City.

______**1986.** Washoe. In, *Great Basin,* edited by W. d'Azevedo, pp. 466-498. Handbook of North American Indians, Volume 11. W. Sturtevant, general editor. Smithsonian Institution. Washington, D. C.

Delacorte, M. 1997. Culture Change along the Eastern Sierra Nevada/Cascade Front, Volume I: History of Investigations and Summary of Findings. Far Western Anthropological Research Group, Inc., Davis, Ca. (NSM 16-751).

Desert Research Institute (DRI). 2003. Estimated Groundwater Recharge to Dry Valley, Northeastern Nevada, Using the Chloride Mass Balance Method. J.T. Thomas and W.H. Albright, Division of Hydrologic Sciences, University and Community College System of Nevada, Publication No. 41191. Prepared for Intermountain Water Supply Ltd, Reno, Nevada. December 2003.

Dixon, R. 1905. The Northern Maidu. *Bulletin of the American Museum of Natural History* 17(3):119-346.

Downs, J. 1966. *The Two Worlds of the Washoe.* Holt, Rhinehart and Winston, New York.

ECO:LOGIC Engineering. 2002. North Valleys Water Supply Comparison. Prepared for Washoe County, Regional Water Planning Commission. October 2002 (revised November 2002).

______**2003.** Memorandum from Dale Bugenig to Mr. Terry Grotbo, Maxim Technologies, Inc. Subject: Results of Chemical Analyses of Recent Samples Collected from the Wells at FSR. November 25, 2003.

______**2004.** Memorandum from John Enloe to Mike Baughman dated September 7, 2004.

Erlich, P., D. Dobkin and D. Wheye. 1988. The Birders Handbook – A Field Guide to the Natural History of North American Birds. Simon and Shuster.

Espinosa, S. 2004. Wildlife Biologist with Nevada Division of Wildlife (NDOW). Personal Communication with Joe Murphy, Maxim Technologies.

Federal Energy Regulatory Commission (FERC) and California State Lands Commission (CSLC). 1994. *Tuscarora Natural Gas Pipeline Project Draft Environmental Impact Report/Environmental Impact Statement.* FERC/EIS-0078D. Docket No. CP 93-685-000. December.

Fish Springs Ranch, LLC. 2004. Application for Water Transmission Pipeline and Plan of Development. Prepared for Vidler Water Company, Inc., 704 West Nye Lane, Ste 201, Carson City, Nevada. Prepared by ECO:LOGIC Consulting Engineers, 10831 Double R Boulevard, Reno, Nevada.

Foresman, K. 2001. The Wild Mammals of Montana. Special Publication No. 12. American Society of Mammalogists. Lawrence, Kansas.

Fowler, C., R. Elston, M. Hamby and J. Nevers. 1981. An Ethnographic and Ethno-archaeological Study of a Washoe Cemetery at Camp Richardson, Lake Tahoe. Prepared for the El Dorado National Forest, U. S. Forest Service, by Intermountain Research, Silver City, Nevada.

Fowler, C., and S. Liljeblad. 1986. Northern Paiute. In, *Handbook of North American Indians, Volume 11*, edited by W. d'Azevado. Smithsonian Institute. Washington, D.C.

Freed, S. and R. Freed. 1963. A Configuration of Aboriginal Washoe Culture. *In:* The Washoe Indians of California and Nevada. University of Utah Anthropological Paper 67. Salt Lake City.

Giesinger, C. 2004. Personal Communication. Planner for Washoe County Department of Community Development. August 24, 2004.

______**2005.** E-mail response to comment on Preliminary Draft Environmental Impact Statement. April.

Gimlett J.I. 1967. Gravity Studies of the Warm Springs Valley, Washoe County Nevada; Nevada Bureau of Mines Report 15.

Handbook of Acoustical Measurements and Noise Control. 1998. Edited by Cyril M. Harris. Acoustical Society of America. Third Edition.

Handman, E., C. Londquist and D. Maurer. 1990. Ground-Water Resources of Honey Lake Valley, Lassen County, California, and Washoe County, Nevada. U.S. Geological Survey, Water-Resources Investigations Report 90-4050.

Harding Lawson Associates. 1994. Total Environmental Program Support, Final Remedial Investigation for Sierra Army Depot – Group III B Sites, Remedial Investigation and Feasibility Study, Lassen County, California. Volumes I and II. Prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, Maryland. June 1994.

Harvey, M., J.Altenbach and T. Best. 1999. Bats of the United States. Arkansas Game and Fish Commission and U.S. Fish and Wildlife Service.

Hatano, M. 1980. Caltrans Noise Manual. Federal Highway Administration CA/TL-80/07.

Heizer, R. 1970. Ethnographic Notes on the Northern Paiute of Humboldt Sink, West Central Nevada. *In; Languages and Cultures of Western North America: Essays in Honor of Sven S. Liljeblad*. E. Swanson, editor. Idaho State University Press. Pocatello.

Herlong Utilities Cooperative, Inc. 2003. Request for Qualification and Statement of Interest (includes three exhibits). From Donald L. Armstrong. January 31, 2003.

Herron, G., C. Mortimore and M. Rawlings. 1985. Nevada Raptors – Their Biology and Management. Biological Bulletin No. 8. Nevada Department of Wildlife. Reno.

InterFlow Hydrology, Inc. 2004a. Numeric Ground-Water Flow Modeling, Bedell Flat Hydrographic Basin, Washoe County, Nevada. Prepared for Intermountain Water Supply, Ltd., Reno, Nevada. November 2004 (amended December 2004).

______**2004b.** Test Well Completion Report, Dry Valley Test Well No. 1, Washoe County, Nevada. Prepared for Intermountain Water Supply, Ltd., Reno, Nevada. October 2004.

______**2005.** Numeric Ground-Water Flow Modeling, Dry Valley Hydrographic Basin, Washoe County, Nevada. Prepared for Intermountain Water Supply, Ltd., Reno, Nevada. February 2005.

InterFlow Hydrology, Inc. and Cordilleran Hydrology, Inc. 2003. Hydrogeology of Bedell Flat and Potential for Ground Water Development, Washoe County, Nevada. Prepared for Intermountain Pipeline, Ltd. Reno, Nevada. IFH Report No. 2003-03. May 2003.

Intermountain Water Supply, Ltd. 2004. Application for Water Transmission Pipeline and Plan of Development. Prepared by Enviroscientists, Inc., 4600 Kietzke lane, Ste C129, Reno, Nevada.

Inter-tribal Council. 1976. Numa: A Northern Paiute History. Inter-tribal Council. Reno, Nevada.

JBR Consultants Group. 1990a. Spring and Seep Survey Technical Report, Western Water Development Company. January 26, 1990.

______**1990b.** Addendum to Spring and Seep Survey Technical report, 1990 Spring and Seep Survey, Western Water development Corporation. October 8, 1990.

Jeff Codega Planning Design, Inc. 2000. Development Standards Handbook. July

Kelly, I. 1932. Ethnography of the Surprise Valley Paiute. University of California Publications in American Archaeology and Ethnography 31(3):67-210. Berkeley.

Knight, T. 2004. Personal Communication. Recreation Program Lead with BLM Carson City Field Office. August 27, 2004.

Kroeber, A. 1925. Handbook of the Indians of California. *Bureau of American Ethnology Bulletin* 78. Washington, D.C.

Lahontan GeoScience, Inc. 2000. Letter report to Mr. Dale Bugenig (ECO:LOGIC). Subject: Summary of Groundwater Modeling Related to Impacts to Groundwater Outflow to Pyramid Lake from Pumping in Honey Lake Valley. November 13, 2000.

______**2003.** Honey Lake Valley Groundwater Analysis, A Sensitivity Analysis of Predicted Groundwater Outflows to Pyramid Lake. Prepared for ECO:LOGIC, Reno, Nevada. October 2003.

______**2004.** Fish Springs Ranch Water Importation Project, Hydrology Technical Report. Prepared for Eco:Logic Engineering. Reno, Nevada. September.

Lassen County. 2004. Department of Community Development. AB303 Local Groundwater Assistance Fund Grant Information. Cover letter dated June 16, 2004 from Robert K. Sorvaag (Lassen County) to Terri Knutson (BLM).

Lopes, T. and D. Evetts. 2004. Ground-Water Pumpage and Artificial Recharge Estimates for Calendar Year 2000 and Average Annual Natural Recharge and Interbasin Flow by Hydrographic Area, Nevada. U.S. Geological Survey, Scientific Investigations Report 2004-5239. Carson City, Nevada.

Lowie, R. 1939. Ethnographic Notes on the Washoe. University of California Publications in American Archaeology and Ethnology 36(5):301-352. Berkeley.

Maxim Technologies (Maxim). 2004. Technical Baseline Report – Pygmy Rabbit Survey Conducted in the Proposed North Valleys Water Pipeline Rights-of-Way Projects. Helena, Montana.

Mayo and Associates, and Slosson and Associates. 1991. Preliminary Analysis of the Hydrogeology of the Honey Lake Basin, California-Nevada, and Analysis of the Effects of Ground Water Withdrawal and Exportation for the Proposed Truckee Meadows Project. Prepared for Lassen County, California. January 12, 1991.

Mayo, A. and J. Slosson. 1992. The Application of Ground-Water Flow Models As Predictive Tools – A Review of Two Ground-Water Models of Eastern Honey Lake Valley, California-Nevada: Bulletin Assoc. Eng. Geol. Vol. XXIX, No. 2, ppg 151-163.

McGuire, K. 1997. Culture Change Along the Eastern Sierra Nevada/Cascade Front, Volume VI: Fort Sage Uplands and Spanish Springs Valley. Far Western Anthropological Research Group, Inc., Davis, Ca.

Moll, N. 2000. A Groundwater Flow Model of Eastern Honey Lake Valley, Lassen County, California and Washoe County, Nevada. M.S. Thesis. University of Nevada. Reno. May.

Moody, E. 1985. Flanigan: Anatomy of a Railroad Ghost Town. Lahontan Images, Susanville, California.

Morefield, J. (editor). 2001. Nevada Rare Plant Atlas. Nevada Natural Heritage Program. Carson City, Nevada.

Nelson, K. 2004. Personal Communication, Realty Specialist with BLM Carson City Field Office. May 13, 2004.

Nevada Bat Working Group. 2002. Nevada Bat Conservation Plan.

Nevada Natural Heritage Program. 2004. Element Occurrence Records for the North Valleys Rights-of-Way Projects Area. Unpublished Technical Reports dated October 2003, May 2004, and June 2004. Carson City.

Nevada State Conservation Commission. 1994. Handbook of Best Management Practices.

Nevada State Engineer, 1974. Water-Legal and Administrative Aspects: Nevada Division of Water Resources. Water for Nevada Special Information Report. 60 p.

Nevers, J. 1976. Wa She Shu: A Washoe Tribal History. Inter-tribal Council of Nevada. Reno.

Pendleton, L., A. McLane and D. Thomas. 1982. Cultural Resource Overview, Carson City District, West Central Nevada. Bureau of Land Management, Nevada. Cultural Resource Series, (5):1. American Museum of Natural History. New York.

Powers, S. 1976. *Tribes of California*. University of California Press. Berkeley. Reprint of the 1877 original.

Price, J. 1962. Washoe Economy. *Nevada State Museum Anthropological Paper* 6, Carson City.

______1980. The Washoe Indians: History, Life Cycle, Religion, Technology, Ecology, and Modern Life. Nevada State Museum Occasional Paper 4. Carson City.

Principia Mathematica Inc. 1993. Evaluation of the Draft Environmental Impact Statement, Bedell Flat Pipelines Rights-of-Way, Washoe County, Nevada. Prepared for County of Lassen, California. September 10, 1993.

Riddell, F. 1960. Honey Lake Paiute Ethnography. Nevada State Museum Anthropological Papers 4. Reprinted in 1978 as *Nevada State Museum Occasional Paper No. 3*. Carson City.

______1968. Ethnography of Two Maidu Groups. *Masterkey* 42(2):45-52.

______1978. Maidu and Konlow. In *The Handbook of North American Indians, Volume 8, California*. Edited by R. Heizer. Pages 370-386. Smithsonian Institution, Washington, D.C.

Rockwell, G.L. 1990. Surface-Water Hydrology of Honey Lake Valley, Lassen County, California, and Washoe County, Nevada. U.S. Geological Survey, Open File Report 90-177.

Rush, F.E., and P. A. Glancy. 1967. Water-Resources Appraisal of the Warm Springs-Lemmon Valley Area, Washoe County, Nevada. Water Resources Reconnaissance Series Report 43. Nevada Department of Conservation and Natural Resources, Carson City. November 1967.

Ryser, F. 1985. Birds of the Great Basin, a Natural History. University of Nevada Press. Reno.

Sanford, M. 2004a. Assessment of Carson Wandering Skipper (*Pseudocopaedes eunus obscurus*) Habitat, Distribution, and Abundance within Areas of Potential Groundwater Drawdown, North Valleys Water Project Honey Lake Valley, Dry Valley, and Bedell Flat Nevada and California. August 2004.

______2004b. North Valleys Rights-of-Way Projects – Special Status Butterfly Survey, Population and Habitat Assessment for the Carson Valley Wood Nymph, *Cercyonis pegala carsonensis* and Carson Valley Silverspot, *Speyeria Nokomis carsonensis*, within Areas of Potential groundwater Cones-of-Depression. Unpublished Report prepared for Maxim Technologies. Helena, Montana. September 2004.

Schultz, D. 2004. Personal Communication, May 10, 2004. Manager of Planning and Environmental Services, Airport Authority of Washoe County.

Sibley, D. 2001. The Sibley Guide to Bird Life and Behavior. Alfred A. Knopf. New York.

Sigler, W. and J. Sigler. 1987. Fishes of the Great Basin, a Natural History. University of Nevada Press. Reno.

Siskin, E. 1941. Washoe Territory. American Anthropologist 40:626-627.

Stantec Consulting Inc. and Cordilleran Hydrology, Inc. 2000. Hydrogeology of Dry Valley, Washoe County, Nevada. Prepared for Intermountain Pipeline, LTD., Reno, Nevada. Project No. 80200134. July 2000.

Stebbins, R. 1985. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin Company. Boston.

Stewart, O. 1939. The Northern Paiute Bands. University of California Anthropological Records 2(3):127-149. Berkeley

______**1941.** Cultural Element Distribution, XIV: Northern Paiute. University of California Anthropological Records 4(3):361-446. Berkeley

Sonoran Institute. 2003. Population, Employment, Earnings, and Personal Income Trends, Economic Profiling System: Washoe County, Nevada

Townley, J. 1983. Tough Little Town on the Truckee. Great Basin Studies Center. Reno, Nevada.

Truckee Meadows Regional Planning Agency (TMRPA). 1991. Truckee Meadows Regional Plan.

______**2003.** Truckee Meadows Regional Plan. Version 6 Amended February 13, 2003.

Uniform Building Code (UBC). 2000. Section 1615- Earthquake Loads – Site Ground Motion, pp 331-353.

U.S. Army Corps of Engineers. 1987. Corps of Engineers Wetland Delineation Manual. Environmental Laboratory. Vicksburg, Mississippi

U.S. Bureau of the Census. 2001. State and County *Quick Facts*. http:quickfacts.census.gov.

U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS). 1983a. Soil Survey of Washoe County, Nevada, Central Part.

______**1983b**. Soil Survey of Washoe County, Nevada, South Part.

______**2004a**. Soil Survey Geographic Database For Washoe County, Nevada, Central Part. NRCS. Available Online at: http://soildatamart.nrcs.usda.gov.

______**2004b**. Soil Survey Geographic Database For Washoe County, Nevada, South Part. NRCS. Available Online at: http://soildatamart.nrcs.usda.gov.

U.S. Department of the Interior, Bureau of Land Management (BLM). 1986. Visual Resource Inventory. BLM Handbook 8410-1.

_______1993. Carson City District Office. *Draft Environmental Impact Statement Bedell Flat Pipeline Right-of-way, Washoe County, Nevada, N-51606 1792/2800 (NV-03337).* May.

_______2001a. Carson City Field Office Consolidated Resource Management Plan.

_______2001b. Carson City Field Office. *Draft Environmental Impact Statement Reno Clay Plant Project 3809(NV030) N30-99-001P.* May.

_______2003. Carson City Field Office. *Draft Tracy-Silver Lake Transmission Line Project Environmental Impact Statement 2800(NV030).* September.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 2004. Species List for North Valleys Water Projects EIS. March.

U.S. Department of Labor, Bureau of Labor Statistics. 2004. Local Area Unemployment Statistics," (available online at www.bls.gov)

U.S. Department of Transportation (DOT). 1995. Transit Noise and Vibration Impact Assessment, Final Report.

U.S. Environmental Protection Agency (EPA). 1971. Community Noise. NTID300.3 (N-96-01II-A-231). Prepared by Wylie Laboratories.

_______1979. Protective Noise levels. EPA 550/9-79-100 (N-96-01-II-A-86).

_______2004. Web site, at http://epa.gov/air/criteria.html

U.S. Geological Survey (USGS). 2003. Water-Resources Evaluation of Dry Valley, West-Central Nevada, Progress Report. March 19, 2003.

_______2004a. Seismic Hazards Program, Internet site http://neic.usgs.gov/neis/epic/epic_circ.html

_______2004b. Quaternary Fault Database; http://earthquake.usgs.gov/qfaults/nv/ren.html

_______2005. Surface Water Data for Nevada: Calendar Year Streamflow Statistics, Truckee River Station USGS 10351700 near Nixon Nevada. Obtained on-line at http://nwis.waterdata.usgs.gov/nv/nwis/annual.

Varian, A. 1997. Use of Environmental Isotopes to Investigate Hydrologic Processes at Honey Lake Basin, Lassen County, California and Washoe County, Nevada. M.S. Thesis, Hydrogeology, University of Nevada, Reno. August.

Voeglin, E. 1942. Culture Element Distribution: Northeast California. *University of California Anthropological Records* 7(2):47-251.

Walker & Associates. 2004. Comparison of the Evapotranspiration Rates Used in the 1990 USGS Ground-Water of Honey Lake Valley to More Recent Estimates of Evapotranspiration based on Micrometeorological in Similar Great Basin Areas. July.

Washoe County Department of Community Development. 2003. Comprehensive Plan – North Valleys Area Plan. February.

______**2004**. Comprehensive Plan, North Valleys Area Plan, Washoe County Department of Community Development. March.

Washoe County Development Code. 1996. Section 110, Article 414 – Noise and Lighting Standards.

Washoe County Fast Facts. 2004. Available at www.co.washoe.nv.us

Washoe County Regional Water Planning Commission (RWPC). 1997. Water Supply Strategy for the North Valleys.

______**2002.** North Valleys Water Supply Comparison.

______**2005.** Conformance review of updated Regional Water Management Plan.

Webber, W. 1996. Salinization of Shallow Ground Waters in Honey Lake Valley, California-Nevada. M.S. Thesis presented to Department of Geology. Brigham Young University. Provo, Utah.

Wentworth, E. 1948. America's Sheep Trails: History, Personalities. Iowa State College Press. Ames.

WESTECH Environmental Services Inc. (Westech). 2004a. North Valleys Rights-of-Way Projects, Washoe County, Nevada, Special Status Plant Survey and Spring/Seep Survey. Unpublished Report. Helena, Montana. August 2004.

______**2004b.** Listing of Wetlands and Non-Wetland Waters of the U.S. along Proposed Water Transmission Pipeline Corridors, North Valleys Rights-of-Way Projects, Washoe County, Nevada. Unpublished Listing.

Western Regional Climatic Center. 2004. Website at www.wrcc.dri.edu

Whitney, B. 2004. Personal Communication. Planner for the Washoe County Department of Community Development. February 13, 2004.

______**2005.** Comments on Preliminary Draft Environmental Impact Statement.

William E. Nork, Inc. 1991. A Synopsis of Drilling and Testing at Fish Springs Ranch and the Development of a Finite Element Model of Ground-Water Flow in Southeastern Honey Lake Valley, Washoe County, Nevada. January 1991.

Young, D., K. McGuire and C. Furnis. 2000. A Class III Cultural Resources Inventory for the Proposed Hungry Valley Lateral Washoe County, Nevada. Far Western Anthropological Research Group (CR3-1963). Davis, California.

Young, D. and K. McGuire. 2003. A Class III Cultural Resource Inventory of Six Alternative Routes for the Proposed Tracy/Silver Lake 120 kV Transmission Line, Washoe County, Nevada. Far Western Anthropological Research Group (BLM CR3-2013). Davis, California.

Zeigler, D. 2005. Director of Regional Planning, Truckee Meadows Regional Planning Agency. Comments on Preliminary Draft Environmental Impact Statement. March.

APPENDIX A

Spring Inventory

TABLE A-1. SPRING/SEEP/WELL SURVEY IN NORTH VALLEYS PROJECTS AREA, JULY 2004

Map and Site No.	1990 JBR Field No.	Site Name	GPS Coordinates (UTM)	Water Feature						Habitat(s)						Estimated Size (acres)				Potential Suitable TES Butterfly Habitat			
				Spring	Seep	Well-Flowing	Well-Pumped or Dry	Re-emergence	Off-Site Source	Aquatic-Flowing	Aquatic-Pond	Herb. Wetland	Shrub Wetland	Herb. Upland	Shrub/Tree Upland	<0.1	0.1-1.0	>1.0-10.0	>10.0	None	Low	Moderate	High
			DRY VALLEY																				
DVC- 81	WW-35	Dry Valley Pools Spring	10S 0755812 4427844	X				X		X	X	X					X						X
DVC- 82	WW-34	Lower Dry Valley Re-emergence	10S 0755672 4427636					X		X	X	X						X					X
DVC- 85	WW-32	Hubbard Spring No. 1 (actually No. 2)	11S 0248985 4424921	X						X		X			X		X					X	
DVC- 86	WW-33	Duckweed Spring	11S 0248339 4426301	X						X		X					X				X		
DVC- 87	WW-?	Unnamed	11S 0248698 4426022	X								X				X					X		
DVC- 88	WW-18	Hubbard Spring No. 2 (actually No. 1)	11S 0248445 4425234	X						X		X						X					X
DVC- 89	WW-88	Contact Seep	11S 0248187 4425127		X							X				X					X		
DVC- 90	WW-17	Wild Rose Spring	11S 0248094 4424954	X						X		X					X			X			
DVC- 91	WW-82	Leaking Bench Spring	11S 0246973 4425224	X						X		X			X		X			X			
DVC- 96	WW-79	Rusty Hinge Spring	11S 0244825 4425655	X						X		X				X						X	
			BEDELL FLAT																				
BF- 133	WW-29	Carl Spring	11S 0255234 4423071	X									X			X				X			
BF- 136	WW-23a	Upper Canyon Spring No. 3	11S 0255889 4422190	X								X				X					X		
BF- 137	WW-23b	Lower Canyon Spring No. 3	11S 0255890 4422130	X								X				X					X		
BF- 138	WW-24	Undeveloped Canyon Spring	11S 0254958 4421899	X						X		X	X			X					X		
BF- 139	WW-25	Canyon Spring No. 2	11S 0254732 4421911	X						X		X				X					X		
BF- 140	WW-26	Canyon Spring No. 1	11S 0253775 4422555	X								X	X			X					X		
BF- 141	WW-27	Undeveloped Canyon Spring	11S 0253600 4422716					X				X				X					X		
BF- 142	WW-31	Raintree (Campbell Ranch) Spring	11S 0252016 4420727	X						X	X	X						X					X
BF- 143	WW-5	Bedell Seep	11S 0256118 4420234		X					X		X	X		X	X				X			
BF- 146	WW-1	Dogskins Willow Spring	11S 0258679 4420007	X								X			X	X				X			
BF- 147	WW-4	Bedell Spring	11S 0256239 4419802	X								X				X				X			
BF- 207	-	Bedell Flat Well	11S 0256899 4413783				X			X	X			X	X	X					X		
BF- 208	-	Unnamed Bedell Flat Troughs/Ponds	11S 0254519 4413116						X	X	X	X		X	X	X						X	
BF- 209	-	Bird Spring	11S 0251778 4409238	X								X					X						X
BF- 210	-	Juniper Spring	11S 0251834 4409090	X								X			X	X					X		

TABLE A-1. SPRING/SEEP/WELL SURVEY IN NORTH VALLEYS PROJECTS AREA, JULY 2004

Map and Site No.	1990 JBR Field No.	Site Name	GPS Coordinates (UTM)	Water Feature						Habitat(s)						Estimated Size (acres)				Potential Suitable TES Butterfly Habitat			
				Spring	Seep	Well-Flowing	Well-Pumped or Dry	Re-emergence	Off-Site Source	Aquatic-Flowing	Aquatic-Pond	Herb. Wetland	Shrub Wetland	Herb. Upland	Shrub/Tree Upland	<0.1	0.1-1.0	>1.0-10.0	>10.0	None	Low	Moderate	High
BF- 211	-	Whitney Spring	11S 0252858 4410563	X								X					X				X		
BF- 212	-	North Bedell Flat Troughs	11S 0254719 4418232						X	X	X	X		X		X				X			
BF- 213	-	Bedell Flat Water Tank	Not recorded						X						X	X				X			
BF- 214	-	South Bedell Flat Troughs/Ponds	Not recorded						X		X			X		X				X			
HONEY LAKE VALLEY																							
HLV- 161	161	Habitation Flowing Well, 4008 T-2	Pending Access																				
HLV- 162	162	Orchard Well, 400 T	10T 0746585 4462005			X						X			X		X						X
HLV- 163	163	North Honey Lake Valley "Seep"	10T 0746102 4462822			X						X			X	X						X	
HLV- 164	164	Flowing Well 4021 T	10T 0746702 4462829			X					X	X				X						X	
HLV- 165	165	High Rock Spring	Pending Access																				
HLV- 168	168	Sulphur Spring	11T 0264553 4462196	X						X	X	X					X					X	
HLV- 169	169	SW Flowing Well, 3891	11T 0263343 4462515			X				X		X					X					X	
HLV- 170	170	SW Flowing Well, 3902	11T 0261987 4463610				X								X	X				X			
HLV- 171	171	South Fence Flowing Well	11T 0262467 4466099			X				X	X	X						X					X
HLV- 172	172	Flowing Well south of Houses	11T 0262421 4466326			X				X		X			X			X					X
HLV- 173	173	Well W of Road and Ranch	11T 0262320 4466348			X				X	X	X					X					X	
HLV- 174	174	First Well No of Round Hole	11T 0262384 4466505			X				X	X	X					X						X
HLV- 175	175	Second Well No of Round Hole	11T 0262372 4466585			X				X		X						X					X
HLV- 176	176	Old Structure Flowing Well, 3901	11T 0261069 4467381			X				X		X					X						X
HLV- 177	177	Rotten Egg Spring	11T 0261371 4468053	X						X		X						X					X
HLV- 178	178	Flowing Well 3866, E of Rotten Egg Spring	11T 0261553 4468217			X				X		X					X					X	
HLV- 179	179	S-most Flowing Well/Spring S of Laird Spring	11T 0260047 4470877	X		X				X	X	X							X				X
HLV- 180	180	Second Spring S of Laird Spring	11T 0260021 4470666	X								X						X					X
HLV- 181	181	First Flowing Well S of Laird Spring	11T 0260013 4471023				X					X		X		X					X		
HLV- 182	182	First Spring S of Laird Spring	11T 0259748 4471124		X							X					X					X	
HLV- 183	183	Laird Spring	11T 0259768 4471765	X						X		X				X						X	
HLV- 200	-	Unknown Water Feature, Alfalfa Field	Feature Not Found																				

TABLE A-1. SPRING/SEEP/WELL SURVEY IN NORTH VALLEYS PROJECTS AREA, JULY 2004

Map and Site No.	1990 JBR Field No.	Site Name	GPS Coordinates (UTM)	Water Feature						Habitat(s)						Estimated Size (acres)				Potential Suitable TES Butterfly Habitat			
				Spring	Seep	Well-Flowing	Well-Pumped or Dry	Re-emergence	Off-Site Source	Aquatic-Flowing	Aquatic-Pond	Herb. Wetland	Shrub Wetland	Herb. Upland	Shrub/Tree Upland	<0.1	0.1-1.0	>1.0-10.0	>10.0	None	Low	Moderate	High
HLV- 201	-	Desert Well (flowing)	11T 0250405 4442703				X					X				X					X		
HLV- 202	-	Lime Rock Well (flowing)	11T 0251834 4442094				X					X					X					X	
HLV- 203	-	Ferrel Playa Well	11T 0252601 4442382						X	X	X	X						X					X
HLV- 204	-	Fish Springs	11T 0254186 4442889				X							X	X	X				X			
HLV- 205	-	Unknown Water Feature, Fish Springs Ranch	Feature Not Found																				
HLV- 206	-	Unnamed Spring	11T 0255503 4444575	X								X			X	X						X	
HLV- 215	-	HLV Sec. 18 Unnamed Seep	Pending Access																				

Source: Westech 2004a

Note: The majority of map numbers and site names derive from "Spring and Seep Technical Report" (and Addendum), prepared for Western Water Development Company by JBR Consultants Group (1990a, 1990b). Prefixes have been added to map numbers (DVC, BF, HLV) to clarify the respective potential areas of drawdown: Dry Valley, Bedell Flat, Honey Lake Valley. JBR field numbers have been retained for reference to detailed field notes appearing in those reports (see Exhibits 1-5).

APPENDIX B

Wetlands and Riparian Survey in Proposed Pipeline Corridors

TABLE B-1. Wetlands and Riparian Survey in Proposed Pipeline Corridors, North Valleys Projects

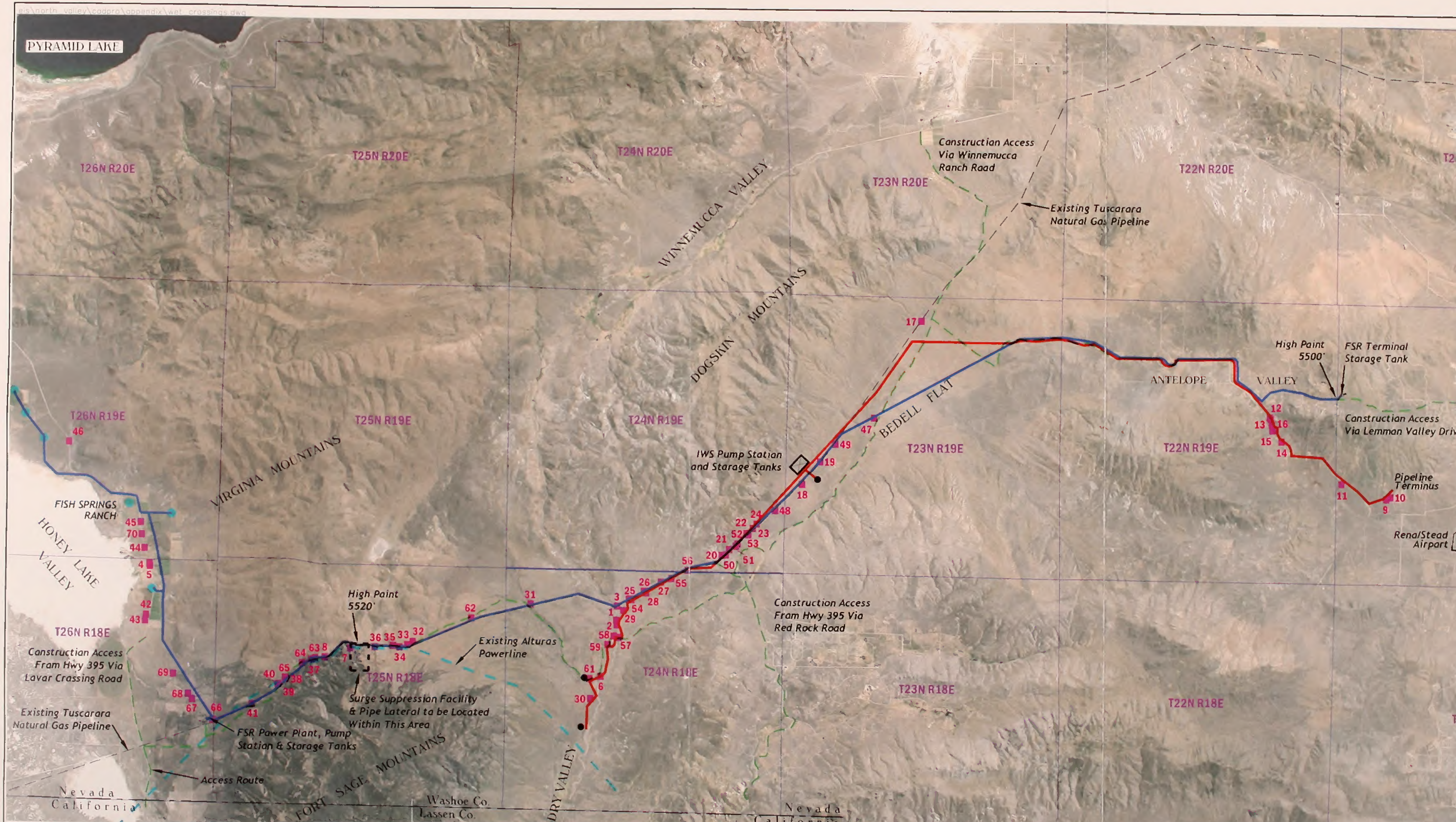
Map Number[1]	Location (GPS UTM Coordinates)[2]	Site Description
1	11S E0250270 N4425733	Wet meadow adjacent to a flowing creek. Total area is approximately ½ acre and is at the edge of the proposed disturbance corridor.
2	11S E0250106 N4425720	Vernally wet creek bed, dry at time of survey but with *Eleocharis*, *Juncus* and *Salix* species present. Bed is 3-4 feet wide.
3	11S E0250760 N4425710	Wetland vegetation along and in flowing creek. Line of green vegetation is approximately 6 feet wide.
4	11T E0252293 N4441802	Potential wetlands on both sides of proposed corridor for perhaps 500 feet. These wetlands continue well outside the proposed disturbance corridor.
5	11T E0252212 N4441785	Part of a complex of potential wetlands that occur in the area that borders the proposed corridor for 500-700 feet and continue outside the corridor.
6	11 E0248333 N4426300	Small spring-fed channel with adjacent meadow. Vegetation is approximately 3 feet wide.
7	11T E0249356 N4434916	Small potential wetland, dry at time of survey but with wetland indicator species. This is at the proposed surge suppression facility by Fish Springs. About 5 feet wide and 250 feet long.
8	11T E0249053 N4435786	Small seep area, about 40 feet wide, heavily utilized by cattle.
9	11S E0254278 N4398955	Small bed 1-2' and bank 6-12", not well-defined. Sandy bed with scant vegetation.
10	11S E0254346 N4398810	Two small drainages merge. Bed 1-2' wide, bank 4-12". Coarse sandy bed with scant vegetation.
11	11S E0254817 N4400528	Small but distinct channel, bed 1-2' wide, bank < 1'. Some vegetation in the sandy bed.
12	11S E0257146 N4403020	Small drainage not well-defined. 1-2' bed, bank <1'. Sand and gravel bed with some annual forbs.
13	11S E0257101 N4402990	Well-defined drainage with a 2-3' bed and a bank 1-2'. Coarse gravel and sand deposits in bed.
14	11S E0256313 N4402620	Well-defined drainage with a 1-2' bed and a bank 6-18". Coarse sand in the bed with some vegetation.
15	11S E0256697 N4402930	Large drainage with several side channels. This drainage eventually parallels the road. Bed 3-4' wide, bank 8"-2'. The bed has sand, rock and boulders, with some shrub vegetation.
16	11S E0256897 N4402951	Well-defined bed 1-2' wide and the bank is 8"-2'. Sandy bed with some shrub vegetation.
17	11S E0260551 N4415124	Large drainage with a bed 3-7' wide and a bank of 1-5'. Bed is coarse sand, gravels and rock with some shrub vegetation.
18	11S E0254932 N4419282	Broad U-shaped drainage. Bed is approximately 3' and vegetated. The bank is indistinct.
19	11S E0255705 N4418650	Well-defined drainage with a 1-2' bed and a 6-18" bank. Coarse sand, rock and gravels in bed.
20	11S E0252499 N4422051	Small channel with a 1-2' bed and 3-18" bank. Coarse sand and gravel in bed.
21	11S E0252701 N4421805	Well-defined drainage with coarse gravel and rock deposits. Bed is 1-2' wide and bank is up to 2'.
22	11S E0253250 N4421203	Well-defined drainage with a flat, sandy bed 1-2', bank 6"-2'.
23	11S E0253421 N4420987	Well-defined drainage with a sandy bed 1-2', bank 6"-3'.
24	11S E0253571 N4420852	Weakly defined drainage with coarse sand, rock and gravel deposits. Bed 1'and bank 6-18".

Map Number[1]	Location (GPS UTM Coordinates)[2]	Site Description
25	11S E0251003 N4425295	Weakly defined drainage with rocky bed 1'wide, bank 2-12". Some vegetation in the channel.
26	11S E0251274 N4424773	Broad rocky drainage with a 3-5' bed, bank is less distinct, 3-18". Some vegetation in the bed.
27	11S E0251579 N4424171 11S E0251208 N4424686	Two channels merge at this point. Bed has rocky gravel 3'-6', bank 1-2'. Some vegetation in channel.
28	11S E0250604 N4425487	Convergence of several channels. Bed is coarse sand 2-3', bank <1.5'. Some low vegetation in bed.
29	11S E0247563 N4426655	Broad wash with coarse sand to large rocky channel. Bed 1-3', bank 1-2'.
30	11S E0250842 N4428702	Well-defined drainage with a broad rock and gravel bed up to 3.5', bank 1-2'.
31	11T E0249562 N4432771	One of several small erosion channels not particularly well-defined. Bed is < 1.5' and bank is < 1'. Bed is vegetated.
32	11T E0249455 N4432953	Better-defined drainage. Bed is coarse sand and rock 1-2', bank to 4'. Bed is vegetated.
33	11T E0249377 N4433223	Weakly defined channel. Bed of coarse gravels 1' wide, bank < 1'. Some vegetation in bed.
34	11T E0249430 N4433460	Well-defined drainage. Bed of coarse sand to rock 1-2' wide, bank 1-3'.
35	11T E0249391 N4434076	One of many channels that dump into a larger drainage that borders the road. Bed is coarse sand and gravel 6"-1' wide, bank 3-18".
36	11T E0248974 N4436236	Small, sandy bed less than 1' wide, bank 1-1.5'.
37	11T E0248309 N4437130	Deep channel with a sandy/silty bed 1-3' wide, bank up to 5'. Some vegetation in the bed with spring-fed water just down the channel.
38	11T E0248309 N4437130	Deep channel with a silty bed 1-3' wide, bank up to 4'.
39	11T E0248141 N4437389	Small drainage with a rocky bed 1-2' wide, bank 1-2'.
40	11T E 0247461 N4438292	Deep drainage by the road. Sand, gravel and large rock in the 1-3' wide bed, bank to 1.5'. Bed is vegetated.
41	11T E0250536 N4441931	Drainage ditch from a culvert that drains irrigated fields. Moist soil and wet vegetation in the 1.5' bed, no defined bank.
42	11T E0250329 N4441968	Another drainage ditch with flowing water and hydrophilic vegetation. Bed is about 1' wide with a low bank.
43	11T E0252832 N4441975	Small muddy depression fed by a drainage channel. Channel bed is 1' wide and 6-12" tall. Larger depression may be a pond early in the season.
44	11T E0253717 N4442106	Small drainage ditch with silty deposits in the 1'wide vegetated bed. Bank is 3-12". The water comes from a culvert that runs under the road from the irrigated fields on the other side.
45	11T E0256503 N4444598	Substantial drainage with a sandy to coarse rocky bottom. Bed is 10' wide and up to 4' tall.
46	11S E0257213 N4416777	Poorly defined drainage, evidence of motorcycle use. Bed is sandy and 15-20' wide, bank 2-3'.
47	11S E0254034 N4420211	Coarse gravel bed 1.5-3' wide, bank to 2'.
48	11S E0256305 N4418124	Poorly defined drainage, bed of fine gravel 3-4'wide, bank 1-1.5'. Vegetation present in channel.
49	11S E0252514 N4421921	Well-defined drainage, bed is sand, gravel and rock 1-2' wide, bank 3-12". Evidence of recent flow & deposition.

Map Number[1]	Location (GPS UTM Coordinates)[2]	Site Description
50	11S E0252816 N4421573	Poorly defined drainage bed is coarse gravel and rock 8"-2' wide, bank 2-4".
51	11S E0252889 N4421515	Weekly defined drainage bed is gravel and rock 8"-2' wide, bank 3-12".
52	11S E0253202 N4421139	Well-defined drainage. Bed of sand and gravel 1-2.5' wide, bank 2"-3'.
53	11S E0250977 N4425203	Broad drainage. Bed is rock and gravel 2-8' wide, bank 6"-1.5'.
54	11S E0251706 N4423808	Broad drainage. Bed is rock and gravel 6-8' wide, 12-16". Some vegetation grows in the channel.
55	11S E0251986 N4423252	Poorly defined channel. Bed is gravel and fine sand 12-16" wide, bank 3-6".
56	11T E0249676 N4425662	Two channels converge into one broad drainage channel. Each channel has a rock and gravel bed 3-6'wide, bank is 4-18".
57	11T E0249719 N4425830	Well-defined drainage. Bed is rock and gravel 1-2' wide, bank is 2-12".
58	11T E0249428 N4426050	Small drainage channel. Bed is rock, sand and gravel 1-2' wide, bank is 2-6".
59	11T E0240989 N4426140	Shallow drainage channel. Bed is rock and gravel 1-3' wide, bank is 2-4".
60	11T E0248257 N4426685	Shallow drainage channel. Bed is rock and gravel 2-6' wide, bank is 2-4".
61	11T E0250364 N4430755	Shallow drainage channel. Bed is rock and gravel 2-4' wide, bank is 2-8".
62	11T E0249022 N4436123	Well-defined drainage. Bed is sand and rock 6-24" wide, bank is 3"-3'. Like a small arroyo.
63	11T E0248854 N4436559	Well-defined drainage. Bed is sand and silt 1-3' wide, bank is 6-12".
64	11T E0248362 N4437145	Shallow drainage. Bed is rock and sand 1-2' wide, bank is 3-12".
65	11T E0246919 N4439640	Well-defined drainage. Bed is coarse rock and sand 3-6' wide, bank is 1-2'.
66	11T E0247630 N4440346	Shallow drainage. Bed is rock, gravel and sand 1-3' wide, bank is 3-6".
67	11T E0247816 N4440482	Wide but shallow drainage. Bed is rock and sand 6-8' wide, bank is 2-6".
68	11T E0248511 N4441003	Shallow and somewhat wide drainage. Bed is sand and rock 3-6' wide, bank is 2-6".
69	11T E0253297 N4442074	Very wide but shallow drainage. Bed is coarse sand and gravel 5-15' wide, bank is 2-8".

[1] See attached Figure for site locations.
[2] Datum NAD 27

Source: Westech 2004b



N

0 Miles 2

LEGEND

IWS	INTERMOUNTAIN WATER SUPPLY		PROPOSED IWS WATERLINE
FSR	FISH SPRINGS RANCH		PROPOSED FSR WATERLINE
	PROPOSED ACCESS ROUTES		
	TUSCARORA NATURAL GAS PIPELINE		PROPOSED IWS WELL
	ALTURAS POWERLINE		PROPOSED FSR WELL
	TOWNSHIP AND RANGE		

20■ WETLAND CROSSINGS

Wetland Crossings
North Valleys Rights-of-Way Projects EIS
Washoe County, Nevada
APPENDIX B-1

APPENDIX C

Groundwater Model Summaries And Evaluation

APPENDIX C
GROUNDWATER MODEL SUMMARIES AND EVALUATION

This appendix provides a summary and evaluation of groundwater flow models performed for the three basins that would be subject to groundwater pumping for the Proposed Actions: Fish Springs Ranch (eastern Honey Lake Valley), Dry Valley, and Bedell Flat. In addition, summaries of previous hydrologic models and studies performed for Honey Lake Valley are included, as well as some of the critiques that were provided for some of the previous models.

HISTORY OF PREVIOUS MODELS

Several groundwater models have been developed for eastern Honey Lake Valley over the past 15 years. Recently, groundwater flow models also have been completed for proposed pumping at Dry Valley and Bedell Flat.

- In 1990, the U.S. Geological Survey (USGS; Handman et al. 1990) developed a four-layer finite difference flow model using MODFLOW®. This model was used by the USGS to simulate withdrawal of groundwater from five irrigation wells at a rate of 5,900 af/yr for 1988 baseline conditions, and withdrawal from 18 wells at a rate of 15,000 af/yr for potential development conditions.

- In 1991, William E. Nork, Inc. (1991) developed a finite-element model for eastern Honey Lake Valley. A solute transport model was completed by Bohm (1991) to evaluate effects of pumping on groundwater quality at Fish Springs Ranch.

- In 1993, the original USGS MODFLOW model for eastern Honey Lake Valley was modified for the "Bedell Flat Pipelines Rights-of-Way Draft EIS" (BLM 1993), simulating 13,000 af/yr of groundwater withdrawal from wells at Fish Springs Ranch and 2,000 af/yr from wells at the Sierra Army Depot. The 1993 model extended the model boundary approximately 3 miles to the west relative to the 1990 USGS model boundary to incorporate the Depot. The groundwater flow model completed for the "Bedell Flat Pipelines Rights-of-Way Draft EIS" (BLM 1993) also includes a solute transport model to evaluate groundwater quality effects from pumping.

- In 2000, Lahontan GeoScience (2000) ran the original 1990 USGS MODFLOW model at pumping rates of 5,900 af/yr (1988 conditions), 8,000 af/yr, 10,000 af/yr, and 15,000 af/yr using the same hydrologic data used by the USGS. In 2003, Lahontan completed a sensitivity analysis of predicted groundwater outflow to Pyramid Lake Valley using the 1990 USGS version of the MODFLOW model.

- In 2000, Moll (2000) completed a new MODFLOW model for southeastern Honey Lake Valley as part of an M.S. Thesis for the University of Nevada-Reno. This model excluded a portion of the east-northeast side of the previous model area where a general head boundary was used, resulting in the elimination of groundwater flow east to Smoke Creek Desert and Pyramid Lake Valley, and underflow recharge from the southeastern Virginia Mountains area. Moll calculated recharge using different methods than previously used for the 1990 and 1993 models. Moll's model also used different evapotranspiration rates and extinction depths.

- In 2004, Lahontan GeoScience (2004) modified the original 1990 USGS MODFLOW model to simulate pumping groundwater from six wells at Fish Springs Ranch at a combined rate of 8,000 af/yr. The 2004 model shifted the western model boundary approximately 5 miles to the east relative to the original 1990 USGS model boundary to coincide with a hydrologic divide, and used general head boundary cells to represent the western model boundary. Results of Lahontan's 2004 model are presented in this EIS to represent the Proposed Action pumping for Fish Springs Ranch (i.e., 8,000 af/yr). See more information about this model below.

- In 2004, Interflow Hydrology (2004) completed a numeric groundwater flow model for Bedell Flat simulating pumping 500 af/yr from one well in the northwestern part of the basin. This report was amended in December 2004 and February 2005.

- In 2005, Interflow Hydrology (2005) completed a numeric groundwater flow model for Dry Valley using two pumping well totaling 3,000 af/yr in the western part of the basin.

CHRONOLOGICAL SUMMARY OF HYDROGEOLOGIC INFORMATION

The following is a chronological summary of key hydrogeologic studies, reports, and models that have been completed in the Projects Areas, including Honey Lake Valley, Dry Valley, and Bedell Flat:

1967: USGS report on Water Resources Appraisal of the Warm Springs-Lemmon Valley Area (Rush and Glancy 1967).

1990: USGS report on Surface Water Hydrology of Honey Lake Valley (Rockwell 1990).

1990: Report on Isotope Hydrology of Southern Honey Lake Valley (Bohm 1990).

1990: USGS report on Ground-Water Resources of Honey Lake Valley, and the original MODFLOW model for this area (Handman et al. 1990).

1990: Technical report and addendum on Spring and Seep Survey (JBR Consultants Group 1990).

1991: In March 1991, the Nevada State Engineer approved Washoe County's plan to import 13,000 af/yr of groundwater from Honey Lake Valley approximately 40 miles north of Reno. The State Engineer's decision was appealed by Lassen County, California and the Pyramid Lake Paiute Tribe. The State Engineer's approval was reversed and remanded in 1992 by Second Judicial Court in Reno. In October 1992, the State Engineer issued a Supplemental Ruling that again approved inter-basin transfer of 13,000 af/yr. A motion to vacate that ruling was denied by the Second Judicial Court in February 1993. The case was subsequently appealed to the Nevada Supreme Court, which confirmed the Supplemental Rulings on Remand in June 1996.

1991: Report on Effects of Pumping on Ground Water Quality in the Fish Springs Aquifer System (Bohm 1991).

1991: Synopsis report of Drilling and Testing at Fish Springs Ranch and Development of a Finite-Element Model of Ground-Water Flow in Southeastern Honey Lake Valley (William E. Nork, Inc. 1991).

1991: Preliminary Analysis of the Hydrogeology of the Honey Lake Basin and Analysis of the Effects of Ground Water Withdrawal and Exportation for the Proposed Truckee Meadows Project (Mayo and Associates, and Slosson and Associates 1991).

1992: Report on the Application of Ground-Water Flow Models as Predictive Tools – A Review of Two Ground-Water Models in Eastern Honey Lake Valley (Mayo and Slosson 1992).

1993: Draft EIS published by BLM for "Bedell Flat Pipelines Rights-of-Way, Washoe County, Nevada." Includes MODFLOW based on the 1990 USGS model, with some modifications.

1993: Evaluation report of Groundwater Modeling in the 1993 Draft EIS for Bedell Flat Pipelines Rights-of-Way prepared for Lassen County, California (Principia Mathematica 1993).

1994: Work on the Final EIS for Bedell Flat Pipelines Rights-of-Way was suspended by the Secretary of the Interior pending resolution of the following issues: 1) concurrence of USGS on regional groundwater modeling; 2) Sierra Army Depot groundwater contamination; and 3) concurrence from the Pyramid Lake Paiute Tribe on Trust Responsibility issues.

1996: Masters Thesis Report by W.D. Webber (April 1996) on Salinization of Shallow Ground Waters in Honey Lake Valley.

1997: Masters Thesis Report by A.R. Varian (August 1997) on Use of Environmental Isotopes to Investigate Hydrologic Processes at Honey Lake Basin.

1998: Nevada State Engineer approves water right of 3,000 af/yr for Intermountain Water Company pumping in Dry Valley.

2000: Report on Hydrogeology of Dry Valley (Stantec Consulting and Cordilleran Hydrology 2000).

2000: Masters Thesis Report by N.A. Moll (May 2000) on A Groundwater Flow Model of Eastern Honey Lake Valley.

2001: USGS report on Hydrogeologic Framework of Antelope Valley and Bedell Flat (Berger et al. 2001).

2003: Report on Sensitivity Analysis of Predicted Groundwater Outflows to Pyramid Lake (Lahontan GeoScience 2003).

2003: Report on Estimated Groundwater Recharge to Dry Valley by the Desert Research Institute (DRI) of Reno, Nevada.

2003: Report on Hydrogeology of Bedell Flat and Potential for Ground Water Development (Interflow Hydrology and Cordilleran Hydrology 2003).

2004: USGS report on Estimates of Natural Ground-Water Discharge in Dry Valley (Berger et al. 2004).

2004: Nevada State Engineer approves water right of 144 af/yr for Intermountain Water Supply pumping in Bedell Flat. This ruling, however, is currently under appeal by Intermountain Water Supply based on the State Engineer's accounting of committed water rights in the basin, and dependence on an old reconnaissance value for perennial yield. Intermountain Water Supply initially requested a water right for 500 af/yr for pumping groundwater in Bedell Flat.

2004: Report on Numeric Ground-Water Flow Modeling for Bedell Flat (Interflow Hydrology, November 2004; amended December 2004 and February 2005).

2004: Report on Comparison of Evapotranspiration Rates used in the 1990 USGS Ground-Water Model of Honey Lake Valley to More Recent Estimates (Walker and Associates 2004).

2004: Report on Groundwater Flow Modeling for Fish Springs Ranch (Lahontan GeoScience, September 2004).

2004: Report on Special Status Plant Survey and Spring/Seep Survey for North Valleys Rights-of-Way Projects (WESTECH Environmental Services 2004).

2004: USGS report on Ground-Water Pumpage and Artificial Recharge Estimates and Average Annual Natural Recharge and Interbasin Flow by Hydrographic Area, Nevada (Lopes and Evetts 2004).

2005: Report on Numeric Ground-Water Flow Modeling for Dry Valley (Interflow Hydrology, February 2005).

COMMENTS ON PREVIOUS MODELS

Subsequent to completing the 1990 USGS MODFLOW model and the 1993 modified MODFLOW model presented in the Draft EIS for "Bedell Flat Pipelines Rights-of-Way", several investigators have reviewed and commented on the models. Following are summaries of some of the investigators' reports.

Mayo, A.L., and J.E. Slossen, 1991. Preliminary Analysis of the Hydrogeology of the Honey Lake Basin, California-Nevada, and Analysis of the Effects of Ground Water Withdrawal and Exportation for the Proposed Truckee Meadows Project. Prepared for Lassen County, California.

Mayo, A.L., and J.E. Slosson, 1992. The Application of Ground-Water Flow Models as Predictive Tools – A Review of Two Ground-Water Models of Eastern Honey Lake Valley, California-Nevada. Bulletin of the Association of Engineering Geologists, Vol. XXIX, No. 2, pp. 151-163.

- Mayo and Slosson review two groundwater models completed for eastern Honey Lake Valley: USGS (Handman et al. 1990) and Truckee Meadows Project (TMP) (Western Water Development Company 1990 or William E. Nork 1991).
- USGS Model is a 4-layer finite difference MODFLOW model. Recharge from precipitation is 4,200 af/yr. It was necessary to increase recharge 37% (additional 5000 af/yr). About 55% of total recharge was assigned to stream flow infiltration. Most groundwater discharge was assigned to evapotranspiration (ET) (54% to 65%). About 30% of groundwater discharge was underflow to the northeast (Smoke Creek Desert) and east (Pyramid Lake Valley).
- TMP model is a single 1,000-ft thick layer 2-dimensional finite element. About 95% of groundwater recharge (18,000 af/yr) was via fault zones in the southern Virginia and Fort Sage mountains.
- Conclusions for USGS model: Construction of 4 layers in the model is not substantiated and geologic conditions do not seem to warrant 4 layers. Estimated aquifer recharge rates are too high from precipitation and stream bed infiltration. Consumptive groundwater use by phreatophyte ET (up to 65%) was overestimated by as much as 50% because of incorrectly using extinction depth – a linear function was used up to 36 feet and ignored seasonal variations. Using 30% groundwater discharge to the east and northeast may be too high or nonexistent. General head boundary conditions were selected without any substantiation. Net effect of constant-head boundaries is to greatly underestimate groundwater declines along the western model boundary. Predicted aquifer response under the 15,000 af/yr scenario is implausible because this simulation required additional groundwater recharge beyond the recharge predicted for 1988 steady-state conditions.
- Conclusions for the Nork or Western Water Development TMP model: Groundwater discharge was over-predicted by 400 to 500 percent. No justification for arbitrary concentration of all natural discharge in central playa area. Model was improperly calibrated. Lack of evidence for significant groundwater recharge from southern model boundary.
- Conclusions for the Bohm solute transport model: Upper limit of 1000 ppm was assigned for chloride even though actual concentrations are much higher. Serious flow and solute mass balance imbalances exist. Model could not predict movement of poor quality water from outside the model domain or predict effects of pumping on CA portion of basin.

<u>Principia Mathematica, Inc., 1993. Evaluation of the Draft Environmental Impact Statement, Bedell Flat Pipelines Rights-of-Way, Washoe County, Nevada. Prepared for County of Lassen, California. September 10, 1993.</u>

- Groundwater flow and solute transport models completed by WESTEC for the 1993 Draft EIS indicate that much of the water produced at Fish Springs Ranch would come by reduction in evapotranspiration (ET). Principia says ET is greatly overestimated, so the amount of ET that can be "salvaged" to other uses is too high.
- Data utilized by WESTEC in both flow and solute transport models are highly uncertain, interpretations concerning them are weak, and attempts to reduce the uncertainty were deficient. Therefore, model results utilizing these data are, scientifically speaking, total unreliable.
- Conclusions for the WESTEC models: Assignments of surface elevation values to model grid cells is only moderately accurate. Assignment of bedrock elevation values to flow model grid cells is incorrect and unsupported. Assignment of property values to geologic features represented in the models is based totally on unverified assumptions. Water level and water quality data are not analyzed, and inferences drawn from these data are not reported. Groundwater information has not been completely characterized nor utilized properly for purposes of modeling, and assumptions are unverified. The numerical grid cell

system is too coarse to provide reliable results. The vertical layering choice for the model is based on unverified assumptions. The representations of both groundwater flow and solute transport mechanisms for purposes of modeling are fatally flawed.

- WESTEC responded to the Principia report in a Memorandum dated February 28, 1994.

Some investigators of the eastern Honey Lake Valley hydrologic system believe there is little or no groundwater flow to Smoke Creek Desert and Pyramid Lake Valley (Bohm 1990; Moll 2000; Varian 1997). The following are summaries of these reports.

<u>Bohm B., 1990. Isotope Hydrology of Southern Honey Lake Valley, Nevada and California. Plumas Geo-Hydrology. Prepared for Washoe County Department of Public Works, Reno, Nevada. August 30, 1990.</u>

- Study used isotope (deuterium, oxygen-18, and tritium) and water quality data collected from about 100 sampling sites. Appendix C in the Bohm report lists all data used, including temperature, pH , electrical conductivity, Ca, Mg, Na, K, Cl, HCO3, SO4, NO3, F, SiO2, As, B, Fe, and Mn. Flow rate at springs was estimated during sampling.
- Deuterium enriched groundwater north and northwest of Wilson well area suggests evaporation in a groundwater sink. It appears that groundwater flow systems of the entire southern Honey Lake Valley flow into the area north and northwest of the Wilson well. Figure 2 in the Bohm report shows area of high TDS located northwest of Wilson well area and trending northeast to Astor Pass area. This could be interpreted to support groundwater flow to Pyramid Lake through the pass, but this is not consistent with the deuterium data.
- Wilson, Ford, and Nork wells produce water with different temperature, isotopic, and chemical composition than wells to the east (i.e., they have a different source). Groundwater in the western area is derived from the Warm Springs Fault Zone and may include cooled geothermal waters. Groundwater in the eastern area originates from precipitation in the Virginia Mountains, possibly as far south as Tule Peak. The peak is out of the topographic drainage basin, but unmapped geologic structures may allow for subsurface flow.
- Part of Long Valley groundwater flow system may discharge to high TDS area northwest of Fish Springs Ranch playa. However, presence of the high TDS indicates that Long Valley groundwater does not flow to the Fish Springs Ranch wellfield under natural conditions.
- Possibility that groundwater from eastern Honey Lake Valley may flow into Dry Valley east of Skedaddle Mountains.
- Groundwater at Astor Pass and Sand Pass are unlike groundwater in eastern Fish Springs Ranch wellfield. As a result, little, if any groundwater from southeastern Honey Lake Valley migrates through Astor and Sand Pass to Pyramid Lake Valley.
- Groundwater from Hodges well area may migrate to the west and/or north into Dry Valley northeast of Honey Lake Valley.
- Significant evaporation seems to occur through the unsaturated zone, but quantifying the amount of evaporation based on chloride and isotopes exceeds scope of this study. Role of phreatophytes in evaporation is not known, but could be clarified by collecting isotope data from plant fluids. Salts accumulated in playa soil during the dry season could be flushed out by precipitation onto the valley floor.
- Groundwater flow to discharge area may also come in part from upward discharge from a bedrock aquifer at depth. Inferred faults could be a conduit.

Moll, N.E., 2000. A Groundwater Flow Model of Eastern Honey Lake Valley, Lassen County, California and Washoe County, Nevada. M.S. Thesis for Hydrology, University of Nevada, Reno. May 2000.

- A new MODFLOW model was constructed for eastern Honey Lake Valley.
- The Moll model used model grid spacing of 1320 feet rather than the 1 mile spacing used for the previous MODFLOW models for eastern Honey Lake Valley.
- The previous USGS MODFLOW model required the addition of 5,000 af/yr of additional inflow occurring from the southeast through volcanic rocks of the Virginia Mountains. This model could not be calibrated without a general head boundary in the northeast that discharged a substantial amount of water from Honey Lake Valley to Smoke Creek Desert and Pyramid Lake.
- The Moll model excluded a portion of the east-northeast side of the previous model area where a general head boundary was used. This eliminates groundwater flow from eastern Honey Lake Valley to Smoke Creek Desert and Pyramid Lake Valley.
- Recharge from infiltration was estimated using a Deep Percolation Model (DPM), similar to the previous models (4,200 af/yr estimated by USGS).
- Recharge from streamflow was estimated based on total stream flow in the model area of about 13,000 af/yr, similar to the previous models. There were some changes made by Moll to distribution of streamflow.
- The USGS included recharge of groundwater inflow from the Virginia Mountains area of 5,000 af/yr. Moll's model eliminates this recharge source from the model.
- The new model used a maximum evapotranspiration (ET) rate of 4 ft/yr, with an extinction depth of 22 feet for most of the area, and 18 feet in the eastern part of the basin. The previous USGS model used an ET of 4 ft/yr and the extinction depth was set at 24 feet over most of the area (maximum of 36 feet).
- Two steady-state pumping scenarios were modeled: 6,000 af/yr and 8,000 af/yr pumping. For these scenarios, total recharge and discharge for the model area is about 16,800 af/yr for each input and output.
- An attempt was made to model 9,000 af/yr of puming, but too many cells in the southeast part of the model dried up.
- Conclusions for Moll model: Well data are sparse or lacking over much of the model area. Recharge estimates may have a large margin of error, especially streamflow infiltration. There is little hard evidence to support ET estimates. Given all sources of error, the groundwater models are only simplifications of the real system in Honey Lake Valley.

Varian, Angela Resella, 1997. Use of Environmental Isotopes to Investigate Hydrologic Processes at Honey Lake Basin, Lassen County, California and Washoe County, Nevada. M.S. Thesis, Hydrogeology, University of Nevada, Reno. August 1997.

- Objectives are to: 1) define isotopic character of water from recharge areas; 2) evaluate origin of shallow and deep groundwater; 3) identify groundwater flow-paths; and 4) provide suggestions for an improved conceptual groundwater model of Honey Lake Valley.
- Main processes controlling groundwater geochemistry are: 1) recharge to alluvial fans from mountains; 2) evapotranspiration (ET); 3) dissolution of evaporate salts; and 4) groundwater mixing. These processes are dependent on paleoclimate and groundwater flow controlled by geologic structures.
- For the study, 16 water samples were analyzed for major ions; others were tested for isotopes. Sample sites include monitoring wells installed at Sierra Army Depot (SIAD) to assess water quality in zones contributing to supply wells.

- Monitoring well clusters at two SIAD supply wells are 2 km apart, but differences in oxygen and carbon isotopes between these locations imply a groundwater flow barrier exists between them at depth >200 feet. Projection of the Warm Springs Fault zone from Fort Sage Mountains to the northwest passes between the two well clusters and is believed to be the groundwater flow barrier. Groundwater east of the inferred barrier is older than that to the west. Fault is referred to as an "impermeable barrier", but there is also suggestion of groundwater discharge up along the fault.
- Isotopic and geochemical data are consistent with shallow groundwater divide near state line that separates east and west portions of basin. This groundwater divide was originally proposed by Webber 1996 based on groundwater elevations.
- Isotopic and geochemical data indicate outflow to Smoke Creek Desert and Pyramid Lake Valley is unlikely.
- Water deep in the basin over 17,000 years old and recharged during colder climate; this deeper water is also much lower in arsenic (only 5 ppb). The oldest water is found throughout the basin at depths below 180 meters.
- Groundwater from the mountains flows along deep flow paths toward the center of the basin and are eventually discharged at the playa surface. Surface runoff that reaches the playa is evaporated, and any residual water will infiltrate. Mixing of the rising groundwater and infiltration occurs beneath the playa. Isotopic data collected near Fish Spring playa are consistent with groundwater discharge within an ET zone.
- Recommendations for future research include: 1) water level data from more wells of known construction; 2) more wells near the state line to better document the shallow groundwater divide; 3) more deep wells, especially near the state line to see if the divide occurs at depth; and 4) groundwater samples across proposed fault zones to assess barriers and conduits of groundwater flow.

FISH SPRINGS RANCH GROUNDWATER FLOW MODEL

In 2004, Lahontan GeoScience, Inc. (Lahontan 2004) modified the original 1990 USGS MODFLOW® model (Handman et al. 1990) to simulate pumping groundwater from six wells at Fish Springs Ranch at a combined rate of 8,000 acre-feet per year (af/yr) (i.e., Proposed Action). The 2004 model shifted the western model boundary approximately 5 miles to the east relative to the original 1990 USGS model boundary, and used general head boundary cells to represent the western model boundary (coinciding with a hydrologic divide). The model boundary encompasses a total area of about 450 square miles that includes most of eastern Honey Lake Valley and southern Smoke Creek Desert (**Figure 4-1**). The model has a uniform grid spacing of 1 mile throughout the model domain.

MODFLOW incorporates several "packages" to simulate hydraulic boundary conditions and aquifer properties. Boundary conditions used in the 2004 Fish Springs Ranch model include:

- No-flow boundaries representing the valley margins and northern portion of the groundwater divide west of the state line.
- General Head (head dependent flux) Boundary Package cells representing southern portion of the groundwater divide west of the state line and groundwater outflow to Smoke Creek Desert and Pyramid Lake Valley.
- Well Package (constant flux boundary) cells representing infiltration from streambeds, groundwater inflow from the south, and pumping from wells.

- Recharge Package (constant flux boundary) representing recharge from infiltrating precipitation.
- Evapotranspiration Package (head dependent flux boundary) representing evaporation from the playa and transpiration from phreotophytes.

Lahontan's (2004) model domain has 32 rows and 14 columns. Hydraulic conductivity (K) values for geologic media in the model (basin fill deposits and volcanic rocks) were assigned to each cell initially using well test data from 36 sites in Honey Lake Valley. K-values were not modified from the original 1990 USGS version of the model during the calibration check. Fault zones were assigned in the model to better simulate measured water levels and gradients where faults are known to exist. K-values assigned to Layer 1 are:

1. Central basin fill deposits = 1 ft/day
2. Perimeter basin fill deposits = 4 ft/day
3. Northern volcanic rocks = 5 ft/day
4. Southern volcanic rocks = 45 ft/day
5. Fault zones = 0.01 to 4 ft/day

Prior to completing this model, Lahontan (2000) ran the original 1990 USGS MODFLOW model at pumping rates of 5,900 af/yr (1988 conditions), 8,000 af/yr, 10,000 af/yr, and 15,000 af/yr using the USGS hydrologic data (Handman et al. 1990). In 2003, Lahontan (2003) completed a sensitivity analysis of predicted groundwater outflow to Pyramid Lake Valley using the 1990 USGS version of the MODFLOW model.

In the most recent version of the model, Lahontan (2004) reviewed information for the Study Area obtained since 1990 including data obtained from the California Department of Water Resources, Sierra Army Depot, Herlong Utilities Cooperative, Washoe County, and Fish Springs Ranch. Improved estimates of evapotranspiration parameters were incorporated into Evapotranspiration Package cells in the model. The central and southern portion of the western boundary of the model was converted to a general head boundary to reflect the apparent groundwater divide in this area. Recent water level data were used as calibration targets and the model was run to demonstrate that the model was still calibrated.

Hydrologic budgets used in Lahontan's 2004 groundwater model (Proposed Action) and for baseline conditions (2003) are presented in **Table C-1**. These water budgets show that total recharge and discharge rates are similar between the baseline condition in year 2003 and the Proposed Action of increasing total pumping rates to 8,000 af/yr. For the Proposed Action, there would be no irrigation return flow which will reduce recharge. For discharge components, the Proposed Action uses a lower groundwater evapotranspiration rate (6,280 af/yr) versus the rate estimated for year 2003 baseline conditions (10,400 af/yr). This difference is due to declining evapotranspiration as the water table is lowered from pumping 8,000 af/yr. The 2004 model incorporates changes in the extinction depths for phreatophytes (30 feet everywhere except 12 feet in playas, versus 24 feet for most of the 1990 USGS model area) and the maximum evapotranspiration rate (40 in/yr versus 48 in/yr used in the 1990 USGS model) (Handman *et al.* 1990; Walker & Associates 2004).

Historical groundwater use since the mid-1980s at Fish Springs Ranch has consisted primarily of pumping from five wells (Hodges, Wilson, Headquarters, Jarboe, and Ferrel) for irrigation purposes (**Figure 3-5**). **Table C-2** shows pumping rates from these wells for 2003 which total

about 4,200 af/yr. Estimated irrigation return flow for this water usage also is shown in **Table C-2**. The Proposed Action includes a total pumping rate of 8,000 af/yr which would be distributed among the five wells as shown in **Table C-2**. A sixth production well may be used, but the maximum combined pumping rate of 8,000 af/yr would not change. **Table C-2** also shows the amount of water that would be pumped from each of the upper two model layers (aquifers). Approximately one-third of project pumping was assigned to Layer 1 and two-thirds to Layer 2. Layer 1 includes the upper water table aquifer ranging from approximately 3,700 to 4,050 feet in elevation, consisting of fine-grained deposits (clay, silt, sand) in the center of the basin, and coarser-grained alluvial deposits (silt, sand, gravel) that surround the valley floor at the base of the mountains. Layer 2 consists almost entirely of fine-grained lake-bed sediments except where volcanic rocks are present, all of which range in elevation from about 3,000 to 3,700 feet.

The groundwater flow model was used to simulate steady-state conditions using year 2003. Baseline pumping for 2003 was approximately 4,190 af/yr. To simulate impacts from the Proposed Action, total pumping in the model was increased from 4,190 af/yr to 8,000 af/yr, distributed in the two model layers as shown in **Table C-2**.

TABLE C-1
Hydrologic Budget for Groundwater Flow Model at Eastern Honey Lake Valley

Recharge and Discharge	**Budget Component**	**Estimated Quantity (acre-feet per year)**	
		2003 Conditions	Proposed Action Conditions at 8,000 af/yr Pumping (steady-state)
Recharge	Direct Infiltration of Precipitation	8,411	8,411
	Infiltration of Surface Runoff	11,890	11,886
	Irrigation Return	1,046	0
	Groundwater Inflow from West (Honey Lake Area)	30	31
Total Recharge		**21,377**	**20,328**
Discharge	Groundwater Evapotranspiration	10,400	6,280
	Withdrawal from Wells	4,202	7,997
	Groundwater Outflow Northeast to Smoke Creek Desert via Sand Pass	5,278	4,707
	Groundwater Outflow East to Pyramid Lake Valley via Astor Pass	1,481	1,328
	Groundwater Outflow West to Honey Lake Area	17	16
Total Discharge		**21,378**	**20,328**

Source: Lahontan 2004 and groundwater model output.

TABLE C-2 Existing and Proposed Pumping Rates at Fish Springs Ranch				
Well	**Total Pumping Volume (ac-ft/yr)**	**Pumping Volume from Model Layer 1**	**Pumping Volume from Model Layer 2**	**Irrigation Return Flow (ac-ft/yr)**
Irrigation Pumping at Fish Springs Ranch in 2003 (Baseline Condition)				
Hodges	544	544	0	136
Wilson	1,005	0	1,005	251
Headquarters	1,549	1,146	403	387
Jarboe	712	356	356	178
Ferrel	377	377	0	94
TOTAL	4,187	2,423	1,764	1,046 (25% of pumping)
Proposed Action Pumping at Fish Springs Ranch				
Hodges	2,000	668	1,332	0
Wilson	2,000	668	1,332	0
Headquarters	2,000	668	1,332	0
Jarboe	1,200	400	800	0
Ferrel	800	266	534	0
TOTAL	8,000	2,670	5,330	0

Source: Lahontan 2004

Note: See **Figure 3-5** for locations of irrigation wells.

Lahontan (2004) performed a calibration check of the groundwater flow model by comparing measured groundwater levels or heads in eastern Honey Lake Valley with water levels predicted by the model for 2003 steady-state conditions. With the exception of changes in Evapotranspiration and General Head Boundary conditions prior to the calibration check, no model parameters were modified during the calibration check. To judge calibration of the modified model, Lahontan (2004) selected calibration goals of root mean square deviation (RMSD) of <5 feet and a correlation coefficient of >0.90 between simulated and measured head values. A total of 28 wells in eastern Honey Lake Valley were used as calibration targets. Calibration results included a RMSD of 4.6 feet and a correlation coefficient of 0.96 (Lahontan 2004). The ratio of RMSD to total range in head across the site was 0.05, which falls within acceptable range. Transient verification was not performed as sufficient transient data were not available.

A sensitivity analysis was performed by Lahontan (2004) on the 1990 USGS version of the model to evaluate the sensitivity of the model to varying parameters used in the model. With the exception of increasing the evapotranspiration rate by a factor of 2, varying model parameters did not result in an acceptable fit of simulated to measured head values. The model is most sensitive to changes in recharge (areal and stream recharge), and least sensitive to evapotranspiration depth and rate (Lahontan 2004). An earlier sensitivity analysis performed by Lahontan (2003) showed that changing hydraulic conductivity values at the general head boundary at Astor Pass has a direct and significant effect on groundwater outflow to Pyramid Lake Valley and Smoke Creek Desert. The level of Pyramid Lake also directly affects groundwater outflow to the lake at the Astor Pass general head boundary. As the lake level rises, groundwater outflow from eastern Honey Lake Valley to Pyramid Lake Valley decreases.

The proposed pumping rate of 8,000 af/yr at Fish Springs Ranch is predicted to cause drawdown of the water table in eastern Honey Lake Valley. Maximum steady-state groundwater drawdown contours for 8,000 af/yr pumping are shown on **Figure 4-1**. The drawdown is calculated by subtracting predicted groundwater surface elevations from baseline conditions in 2003 where net irrigation withdrawal (total pumping minus irrigation return flow) at Fish Springs Ranch was about 3,140 af/yr (**Table C-2**). Based on recent model predictions using a total groundwater pumping rate of 8,000 af/yr (Lahontan 2004), the amount of groundwater drawdown would be up to about 30 feet (at 100 years) near the production wells at Fish Springs Ranch, to <1 foot at distances of about 1 to 5 miles west and north of the production wells (**Figure 4-1**).

Maximum drawdown at the state line would be 1 foot or less, with no drawdown occurring beyond 4 miles west of the state line, coincident with the groundwater divide shown on **Figure 4-1** (Lahontan 2004). Maximum drawdown predicted at Astor Pass near Pyramid Lake Valley, and Sand Pass near Smoke Creek Desert, would be approximately 15 feet and 10 feet, respectively.

Figures C-1 and **C-2** in this appendix are hydrographs of groundwater drawdown versus time (0 to 100 years) developed using Lahontan's 2004 model for a well in the Sand Pass and Astor Pass area and a well in the Fish Springs Ranch area, respectively. The Pass area well shows drawdown of about 1 foot at year 10 and 9 feet at year 100. The Ranch area well shows about 6 feet of drawdown at year 1 and 15 feet of drawdown at year 100; this well is not located in the area of maximum groundwater drawdown at Fish Springs Ranch. **Figures C-3, C-4,** and **C-5** in this appendix show the distribution of groundwater drawdown in Layer 1 throughout eastern Honey Lake Valley in plan view for 1, 10, and 100 years, respectively, after initiation of pumping 8,000 af/yr. According to Lahontan (2004), 95 percent of total groundwater drawdown is achieved in the pumping center after 100 years of pumping.

Based on model predictions, groundwater outflow to Pyramid Lake Valley via Astor Pass would be reduced by about 150 af/yr or 10 percent of baseline conditions (**Table C-1**). Groundwater outflow to Smoke Creek Desert via Sand Pass would be reduced by about 570 af/yr or 11 percent of baseline conditions (**Table C-1**). Due to minor groundwater drawdown (<1 foot) between the state-line and 3 miles west of the state-line, a minor decrease in groundwater outflow of about 1 af/yr would occur from east to west across the state line (**Table C-1**). These model results also suggest that as a result of pumping, the hydraulic divide west of the state line may be moved a short distance farther west.

DRY VALLEY GROUNDWATER FLOW MODEL

Interflow Hydrology (2005) developed a 3-dimesional numerical groundwater flow model using MODFLOW to simulate pumping groundwater from two wells (yet to be completed) at a combined rate of 3,000 af/yr. The two simulated production wells are located in west-central Dry Valley near existing wells DV-TW-1 and DV-2 (**Figure 3-5**). The model boundary encompasses an area of about 17.5 square miles that includes most of the lower (western) valley floor (**Figure 4-2**). The model includes a uniform grid spacing of 500 feet.

The model contains three layers: Layer 1 represents about the upper 250 feet of Quaternary-age alluvium ; Layer 2 represents a finer-grained portion of Tertiary-aged basin-fill deposits; and

Layer 3 represents the deeper coarser-grained Tertiary-aged basin-fill sediments. Layer 1 groundwater is unconfined, Layer 3 is confined, and Layer 2 is convertible unconfined/confined. Hydraulic conductivity values used in the model are 4.0, 0.25, and 1.0 ft/day for for Layers 1, 2, and 3, respectively. Total combined thickness of the three layers that would be subject to groundwater withdrawal for the Proposed Action is a maximum of 1,150 feet at the state line.

Boundary conditions used in the Dry Valley model include:

- No-flow boundaries to represent valley margins.
- General Head (head-dependent flux) Boundary Package cells to represent groundwater flux across the state line.
- Well Package (constant flux boundary) to represent groundwater inflow though the fault zone.
- Recharge Package (constant flux boundary) representing infiltration from streambeds and precipitation from the surrounding mountains.
- Evapotranspiration Package (head dependent flux boundary) cells representing transpiration from phreotophytes along the creek.

The model was calibrated to steady-state conditions to simulate historic water levels at 10 wells in Dry Valley within a reasonable range of error. Results of this model were used to represent baseline groundwater elevations in the basin. Subsequently, the model was amended to simulate pumping from two wells located in west-central Dry Valley at a combined rate of 3,000 af/yr (Proposed Action).

Hydrologic budgets used by Interflow Hydrology (2005) in the steady state baseline model and pumping simulation are presented in **Table C-3**. The model incorporates 930 af/yr of groundwater recharge: 437 af/yr to Layer 1 from precipitation, and 493 af/yr to Layer 3 from geothermal groundwater inflow. Discharge from the model area includes evapotranspiration at a rate of 512 af/yr. An extinction depth of 30 feet was assumed based on the type of phreatophytes present in Dry Valley. Groundwater outflow westward across the state line to Long Valley, California is simulated at 418 af/yr.

A major fault zone that extends through the eastern portion of Dry Valley – Walker-Lane Shear Zone, including the Warm Springs Fault Zone – is outside the model boundary. To the extent that groundwater outflow exists through this structural zone to Honey Lake Valley, Warm Springs Valley, and/or Winnemucca Valley, it is assumed to be beyond the capture zone of proposed pumping in western Dry Valley.

The groundwater flow model was used to simulate steady-state conditions using year 2004. To simulate impacts from the Proposed Action, total pumping in the model was established at 3,000 af/yr, distributed evenly between two wells.

TABLE C-3 Hydrologic Budget for Dry Valley Groundwater Flow Model			
Recharge and Discharge	**Budget Component**	**Estimated Quantity (acre-feet per year)**	
		Baseline Model Conditions	Proposed Action Conditions at 3,000 af/yr Pumping (steady-state)
Recharge	Groundwater Inflow from Fault Zone	494	494
	Recharge from Mountains	622	622
	Recharge from Upper Valley Streambed	47	47
	Recharge from Lower Valley Streambed	70	0
	Groundwater Inflow Across State Line	0	1,866
	Total Recharge	**1,233**	**3,029**
Discharge	Withdrawal from Wells	0	3007
	Groundwater Discharge to Stream	284	0
	Evapotranspiration	550	0
	Groundwater Outflow Across State Line	399	0
	Total Discharge	**1,233**	**3,007**

Source: Interflow Hydrology 2005; Groundwater model output.

Interflow Hydrology (2005) calibrated the groundwater flow model to measured groundwater levels or heads at 10 wells/piezometers in Dry Valley. Results of the calibration process showed a mean residual error of 1.4 feet with a standard deviation of 5.4 feet (Interflow Hydrology 2005). Calibration was not performed for transient conditions as there were insufficient data to match for actual field conditions.

Interflow Hydrology (2005) performed a sensitivity analysis to evaluate the sensitivity of the model to varying parameters used in the model. The model is most sensitive to changes in storage coefficient of the aquifer, with moderate sensitivity to varying hydraulic conductivity, general head boundary conductance, recharge, and evapotranspiration. The conclusion is that altering any of the variables by 20 percent, other than storage coefficient, would not produce significantly differing simulation results (Interflow Hydrology 2005).

To simulate groundwater conditions that would develop under the Proposed Action, pumping from two wells in west-central Dry Valley at a combined rate of 3,000 af/yr was simulated using the model. Comparing the steady-state baseline and pumping condition water budgets in **Table C-3** indicates that pumping 3,000 af/yr is predicted to eventually completely eliminate evapotranspiration (550 af/yr) and groundwater outflow to Long Valley (399 af/yr) in the model area. In addition, a groundwater flux from Long Valley back into Dry Valley is induced at 1,866 af/yr (Interflow Hydrology 2005). These changes would take over 100 years to accomplish.

Pumping from Dry Valley at 3,000 af/yr could eventually reduce any groundwater outflow occurring from upper Dry Valley to Warm Springs Valley (including Winnemucca Valley) via the Walker Lane fault zone. This area is outside of the model domain; however, the groundwater drawdown zone of influence could eventually extend into upper Dry Valley. Interflow Hydrology (2005) and the USGS (Berger *et al.* 2004) believe that hypothetical groundwater outflow along the Walker Lane fault zone northwest to Honey Lake Valley is not supported by the occurrence of springs along the fault zone. Deep geothermal groundwater inflow is simulated in the model for baseline and pumping conditions.

For the proposed pumping of 3,000 af/yr, predicted groundwater drawdown eventually would be over 200 feet at the state line (**Figure 4-2**) and would result in complete dewatering of entire aquifer, except that portion within 5000 feet of the state line. Model results suggest that a pumping rate of 3,000 af/yr in western Dry Valley cannot be sustained indefinitely. Drawdown at the pumping wells eventually would be about 1,500 feet. Drawdown is calculated by subtracting groundwater surface elevations developed using the baseline model from elevations developed for pumping under the Proposed Action. According to Interflow Hydrology (2005), approximately 85 percent of reductions in water levels, subsurface outflow, and evapotranspiration are achieved after 100 years of pumping.

Figure C-6 in this appendix presents hydrographs of groundwater drawdown versus time (0 to 100 years) developed using Interflow Hydrology's 2005 model for two wells near the state line: Well No. 16 (USGS) and Well No. 17 (Lenz domestic well) (see **Figure 3-5** for well locations). Both wells show predicted drawdown of 15 to 25 feet at year 10, and about 220 feet at year 100. **Figures C-7, C-8,** and **C-9** in this appendix show the distribution of groundwater drawdown in Layer 3 throughout western Dry Valley in plan view for 1, 10, and 100 years, respectively, after initiation of pumping 3,000 af/yr. For the steady-state condition (>100 years) and at 100 years, most of the eastern two-thirds of the modeled area would go dry.

BEDELL FLAT GROUNDWATER FLOW MODEL

Interflow Hydrology (2004b) developed a 2-dimensioanl gropundwater flow model using MODLFLOW to simulate pumping groundwater from existing well BF-2 at a rate of 500 af/yr. Well BF-2 is 12 inches in diameter, 400 feet deep, and is located in the northwest potion of Bedell Flat (**Figure 3-5**). The model domain encompasses most of the Bedell Flat hydrographic area, including the mountain blocks surrounding the valley floor (**Figure 4-3**). The model has a uniform grid spacing of 1,000 feet.

Layer 1represents the active groundwater flow system comprised primarily of unconsolidated basin fill deposits. Layer 1 also includes fractured volcanic bedrock in the southern part of the model domain and at four locations of subsurface outflow from the basin. The top of Layer 1 represents ground surface, and the bottom of Layer 1 is the surface of low permeable granite bedrock which is a no-flow boundary. Layer 1 is assigned aquifer properties ranging from confined to unconfined conditions.

The following boundary conditions were used in the Bedell Flat model:

- No-flow boundaries to represent the valley margin.
- General Head (head dependent flux) Boundary cells to represent groundwater outflow to Red Rock, Antelope and Warm Springs valleys.
- Recharge Package cells to simulate recharge from infiltrating precipitation and runoff from Dogskin Mountain, Fred's Mountain and Sand Hills.
- Evapotranspiration Package cells to simulate spring discharge and evapotranspiration due to phreatophytes in the northwest corner of the model domain.

Subsurface outflow through unconsolidated fill and fractured bedrock occurs from the northwest side of the basin to Red Rock Valley located at the northwest margin of Bedell Flat near the boundary with Red Rock Valley (**Figure 4-3**). Subsurface outflow through fractured bedrock is modeled from the east side of the basin to Warm Springs Valley and Antelope Valley. Evapotranspiration occurs in the Campbell Spring area located at the northwest margin of Bedell Flat at the boundary with Red Rock Valley (**Figure 4-3**). Discharge from the spring is included in the evapotranspiration budget (**Table C-4**). The evapotranspiration rate and extinction depth (50 feet) used in the model produce 73 af/yr of discharge at the Campbell Spring area. Total discharge from the basin is assumed to equal recharge. As a result, under baseline conditions, combined total discharge via groundwater outflow is the remainder of available recharge, or 1,232 af/yr.

Hydraulic conductivity values for Layer 1 were distributed and refined during model calibration and range from 0.03 to 5.3 ft/day (Interflow Hydrology 2004b). Hydraulic conductivity assigned to the two pumping well locations is 1.0 ft/day, consistent with aquifer test data for this part of the basin.

The model was calibrated to steady-state conditions to match measured and estimated water levels at eight wells in Bedell Flat. Results of this model were used to represent baseline groundwater elevations in the basin. Subsequently, the model was modified to simulate pumping well BF-2 located in the northwest side of Bedell Flat at a rate of 500 af/yr (Proposed Action).

The steady-state model for baseline 2004 conditions was calibrated with simulated results from the model. Bedell Flat is assumed to be in equilibrium conditions (i.e., water in equals water out of the basin). Groundwater levels were measured at eight well locations throughout Bedell Flat, which were used as the model calibration targets. Results of the calibration process showed a mean residual error of 2.3 feet with a standard deviation of 8.9 feet (Interflow Hydrology 2004b). Calibration was not performed for transient conditions as there were insufficient data to match for actual field conditions.

A sensitivity analysis was performed by Interflow Hydrology (2004b) to evaluate the sensitivity of the model to varying parameters used in the model. The model is least sensitive to changes in evapotranspiration and storage coefficient, with moderate sensitivity to varying recharge and hydraulic conductivity. The model is subject to numeric instability (i.e., inability of modeling code to arrive at a solution) if even moderate changes to the general head boundaries are imposed (Interflow Hydrology 2004b).

TABLE C-4 Hydrologic Budget for Groundwater Flow Model at Bedell Flat			
Recharge and Discharge	**Budget Component**	**Estimated Quantity (acre-feet per year)**	
		Baseline Model Conditions	Proposed Action Conditions at 500 af/yr Pumping (steady-state)
Recharge	Precipitation	1,306	1,306
	Groundwater Inflow	0	0
Total Recharge		**1,306**	**1,306**
Discharge	Groundwater Evapotranspiration	73	29
	Groundwater Outflow to Red Rock Valley	450	155
	Groundwater Outflow to Warm Springs Valley	782	621
	Withdrawal from Wells	0	501
Total Discharge		**1,305**	**1,306**

Source: Interflow Hydrology 2004b.
Note: Groundwater outflow to Antelope Valley is negligible.

Hydrologic budgets resulting from the baseline model and pumping simulation are presented in **Table C-4**. The model assumes 1,306 af/yr of total groundwater recharge based on results of the Maxey-Eakin and chloride-balance estimating techniques previously applied to Bedell Flat (Maxey et al. 1966, Rush and Glancy 1967, Interflow Hydrology 2003). Recharge is distributed to the model at the valley floor margins adjacent to the three major mountain blocks that bound the watershed: Dogskin Mountain along the north edge of the basin adds 75 percent of total recharge, Freds Mountain along the south edge adds 14 percent, and Sand Hills along the west edge adds 11 percent of total recharge (Interflow Hydrology 2004b).

To simulate groundwater conditions that develop under the Proposed Action, pumping of well BF-2 in the northwest side of Bedell Flat at a rate of 500 af/yr is used as a groundwater discharge component, in addition to evapotranspiration and subsurface outflow. The water budgets show that total recharge and discharge rates are similar between the baseline condition and Proposed Action (**Table C-4**). Comparing the baseline and pumping condition water budgets indicates that pumping 500 af/yr is predicted to reduce evapotranspiration near Campbell Spring from 73 to 29 af/yr. Total subsurface outflow through the two outflow locations modeled is predicted to decrease from 1,232 to 776 af/yr.

For the proposed pumping of 500 af/yr, predicted groundwater drawdown eventually would be 116 feet in the vicinity of pumping well BF-2, 28 feet at Campbell Spring, 35 feet at the BLM stockwater well located near the valley center, 32 feet at a domestic well at the east margin of the basin, and 9 feet at domestic wells along the southern margin of the basin (**Figure 4-3**). Drawdown is calculated by subtracting groundwater surface elevations developed using the baseline model from elevations developed for pumping under the Proposed Action. According

to Interflow Hydrology (2004b), 65 percent of reductions in water levels, subsurface outflow, and evapotranspiration are achieved after 100 years of pumping.

Figure C-10 in this appendix presents hydrographs of groundwater drawdown versus time (0 to 100 years) developed using Interflow Hydrology's 2004 model for two wells in Bedell Flat -- BLM stockwater well and Etcheverry domestic well No. 16 (see **Figure 3-5** for well locations). The BLM stockwater well shows drawdown of about 0.2 feet in year 1, and 11.7 feet in year 100. Predicted drawdown of 0.01 foot or less occurs at the domestic well in southern Bedell Flat at both 1 and 100 years. **Figures C-11, C-12** and **C-13** in this appendix show the distribution of groundwater drawdown in Layer 1 throughout Bedell Flat in plan view for 1, 10, and 100 years, respectively, after initiation of pumping 500 af/yr.

REFERENCES

Berger, D.L., Maurer, D.K., Lopes, T.J., and Halford, K.J., 2004. Estimates of Natural Ground-Water Discharge and Characterization of Water Quality in Dry Valley, Washoe County, West-Central Nevada, 2002-2003. U.S. Geological Survey, Scientific Investigations Report 2004-5155. Carson City, Nevada.

Berger, D.L., Ponce, D.A., and Ross, W.C., 2001. Hydrogeologic Framework of Antelope Valley and Bedell Flat, Washoe County, West-Central Nevada. U.S. Geological Survey, Water Resources Investigations Report 01-4220.

Berger, D.L. and Lopes, J. T., 2002. Project Proposal for a Ground-Water Resource Evaluation of Dry Valley, Washoe County, West-Central Nevada. U.S. Geological Survey, Water Resources Division, Nevada District Office. April 2002.

Bohm, B., 1990. Isotope Hydrology of Southern Honey Lake Valley, Nevada and California. Plumas Geo-Hydrology. Prepared for Washoe County Department of Public Works, Reno, Nevada. August 30, 1990.

Bohm, B., 1991. Effects of Pumping on Ground Water Quality in the Fish Springs Aquifer System, Southeastern Honey Lake Valley, Nevada. Plumas Geo-Hydrology. Prepared for Western Water Development Company, Inc., Reno, Nevada. June 30, 1991.

Desert Research Institute (DRI), 2003. Estimated Groundwater Recharge to Dry Valley, Northeastern Nevada, Using the Chloride Mass Balance Method. Division of Hydrologic Sciences, University and Community College System of Nevada, Publication No. 41191. Prepared for Intermountain Water Supply Ltd, Reno, Nevada. Dated December.

Handman, E.H., Londquist, C.J., and Maurer, D.K., 1990. Ground-Water Resources of Honey Lake Valley, Lassen County, California, and Washoe County, Nevada. U.S. Geological Survey, Water-Resources Investigations Report 90-4050.

Interflow Hydrology, Inc. and Cordilleran Hydrology, Inc., 2003. Hydrogeology of Bedell Flat and Potential for Ground Water Development, Washoe County, Nevada. Prepared for Intermountain Pipeline, LTD, Reno, Nevada. IFH Report No. 2003-03. May 2003.

Interflow Hydrology, Inc., 2004. Numeric Ground-Water Flow Modeling Bedell Flat Hydrographic Basin, Washoe County, Nevada. Prepared for Intermountain Water Supply, Ltd., Reno, Nevada. November 2004.

JBR Consultants Group, 1990a. Spring and Seep Survey Technical Report. Prepared for Western Water Development Company, Salt Lake City, Utah. January 26, 1990.

JBR Consultants Group, 1990b. Addendum to 1990 Spring and Seep Survey Technical Report. Prepared for Western Water Development Company, Salt Lake City, Utah. January 26, 1990.

Lahontan GeoScience, Inc., 2000. Letter report to Mr. Dale Bugenig (ECO:LOGIC). Subject: Summary of Groundwater Modeling Related to Impacts to Groundwater Outflow to Pyramid Lake from Pumping in Honey Lake Valley. November 13, 2000.

Lahontan GeoScience, Inc., 2003. Honey Lake Valley Groundwater Analysis, A Sensitivity Analysis of Predicted Groundwater Outflows to Pyramid Lake. Prepared for ECO:LOGIC, Reno, Nevada. October 2003.

Lahontan GeoScience, Inc., 2004. FSR Water Importation Project, Hydrology Technical Report. Prepared for Eco:Logic Engineering, Reno, Nevada. September 2004.

Lassen County, 2004. Department of Community Development. AB303 Local Groundwater Assistance Fund Grant Information. Cover letter dated June 16, 2004 from Robert K. Sorvaag (Lassen County) to Terri Knutson (BLM).

Lopes, T.J. and Evetts, D.M., 2004. Ground-Water Pumpage and Artificial Recharge Estimates for Calendar Year 2000 and Average Annual Natural Recharge and Interbasin Flow by Hydrographic Area, Nevada. U.S. Geological Survey, Scientific Investigations Report 2004-5239. Carson City, Nevada.

Mayo, A.L., and Slosson, J.E., 1991. Preliminary Analysis of the Hydrogeology of the Honey Lake Basin, California-Nevada, and Analysis of the Effects of Ground Water Withdrawal and Exportation for the Proposed Truckee Meadows Project. Prepared for Lassen County, California. January 12, 1991.

Mayo, A.L., and Slosson, J.E., 1992. The Application of Ground-Water Flow Modls as Predictive Tools – A Review of Two Ground-Water Models of Eastern Honey Lake Valley, California-Nevada. Bulletin of the Association of Engineering Geologists, Vol. XXIX, Number 2. June 1992.

Moll, N.E., 2000. A Groundwater Flow Model of Eastern Honey Lake Valley, Lassen County, California and Washoe County, Nevada. M.S. Thesis for Hydrology, University of Nevada, Reno. May 2000.

Principia Mathematica Inc., 1993. Evaluation of the Draft Environmental Impact Statement, Bedell Flat Pipelines Rights-of-Way, Washoe County, Nevada. Prepared for County of Lassen, California. September 10, 1993.

Rockwell, G.L., 1990. Surface-Water Hydrology of Honey Lake Valley, Lassen County, California, and Washoe County, Nevada. U.S. Geological Survey, Open File Report 90-177.

Rush, F.E. and Glancy, P.A., 1967. Water-Resources Appraisal of the Warm Springs-Lemmon Valley Area, Washoe County, Nevada. Water Resources Reconnaissance Series Report 43. Nevada Department of Conservation and Natural Resources, Carson City. November 1967.

Stantec Consulting Inc., and Cordilleran Hydrology, Inc., 2000. Hydrogeology of Dry Valley, Washoe County, Nevada. Prepared for Intermountain Pipeline, LTD., Reno, Nevada. Project No. 80200134. July 2000.

U.S. Department of the Interior, Bureau of Land Management (BLM), 1993. Draft Environmental Impact Statement, Bedell Flat Pipelines Rights-of-Way, Washoe County, Nevada. Carson City District Office, Nevada. May 1993.

U.S. Geological Survey (USGS), 2005. Surface Water Data for Nevada: Calendar Year Streamflow Statistics, Truckee River Station USGS 10351700 near Nixon Nevada. Obtained on-line at http://nwis.waterdata.usgs.gov/nv/nwis/annual.

Varian, A.R., 1997. Use of Environmental Isotopes to Investigate Hydrologic Processes at Honey Lake Basin, Lassen County, California and Washoe County, Nevada. M.S. Thesis, Hydrogeology, University of Nevada, Reno. August 1997.

Walker & Associates, 2004. Comparison of the Evapo-Transpiration Rates Used in the 1990 USGS Ground-Water of Honey Lake Valley to More Recent Estimates of Evapotranspiration based on Micrometeorological in Similar Great Basin Areas. July.

Webber, William D., 1996. Salinization of Shallow Ground Waters in Honey Lake Valley, California-Nevada. M.S. Thesis for Geology Department, Brigham Young University. April 1996.

WESTEC, 1994. Memorandum from Ms. Carol Oberholtzer (WESTEC) to Mr. Dave Loomis (BLM), re: Draft Response to Comments on Principia Report.

WESTECH Environmental Services, Inc., 2004. Special Status Plant Survey and Spring/Seep Survey, North Valleys Rights-of-Way Projects, Washoe County, Nevada. August 2004. Prepared with assistance from Maxim Technologies, Inc.

William E. Nork, Inc., 1991. A Synopsis of Drilling and Testing at Fish Springs Ranch and the Development of a Finite Element Model of Ground-Water Flow in Southeastern Honey Lake Valley, Washoe County, Nevada. January 1991.

FIGURE C-1
Computed Drawdown vs. Time at Well 37
Sand & Astor Pass Areas, Eastern Honey Lake Valley

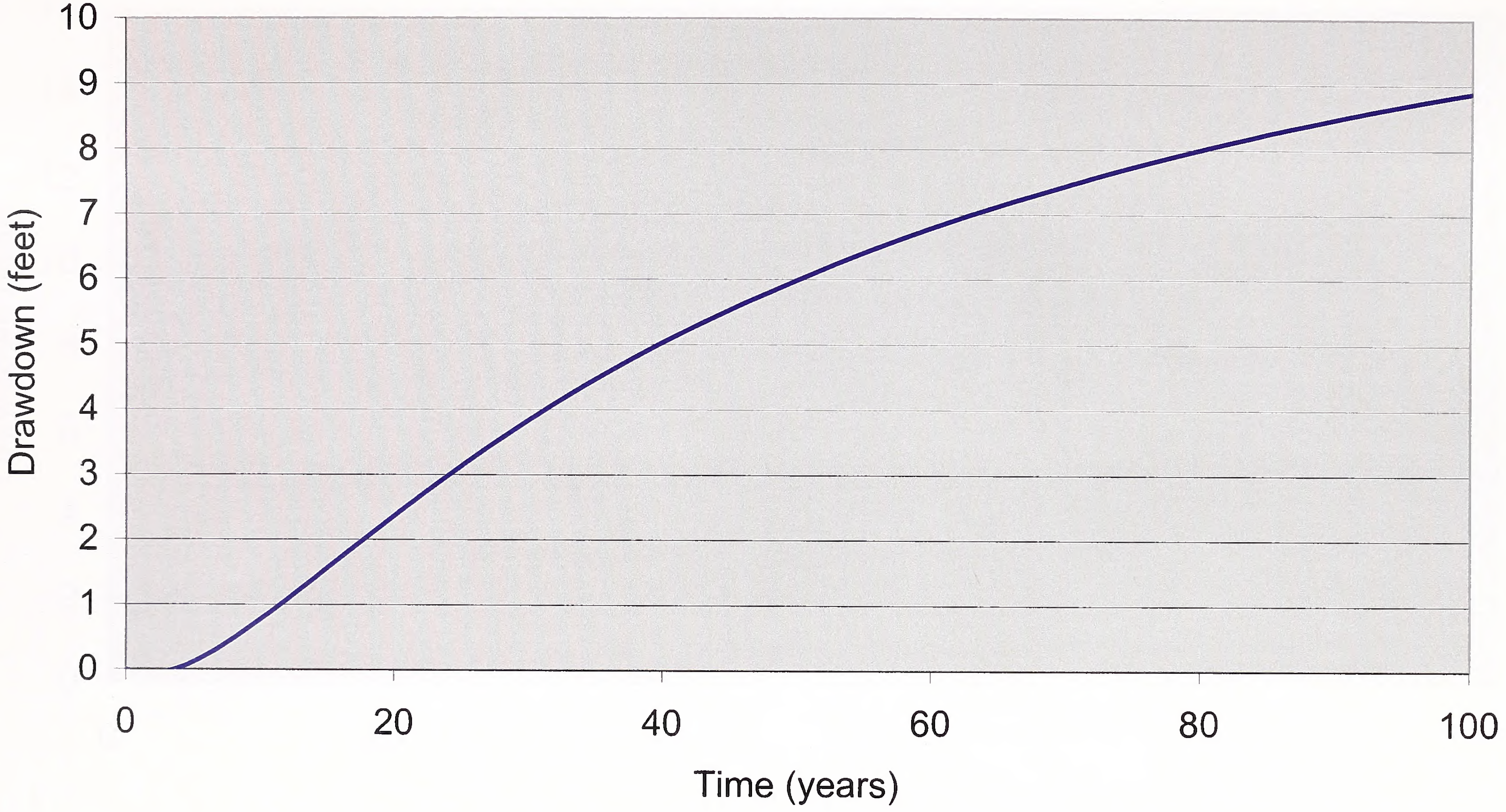
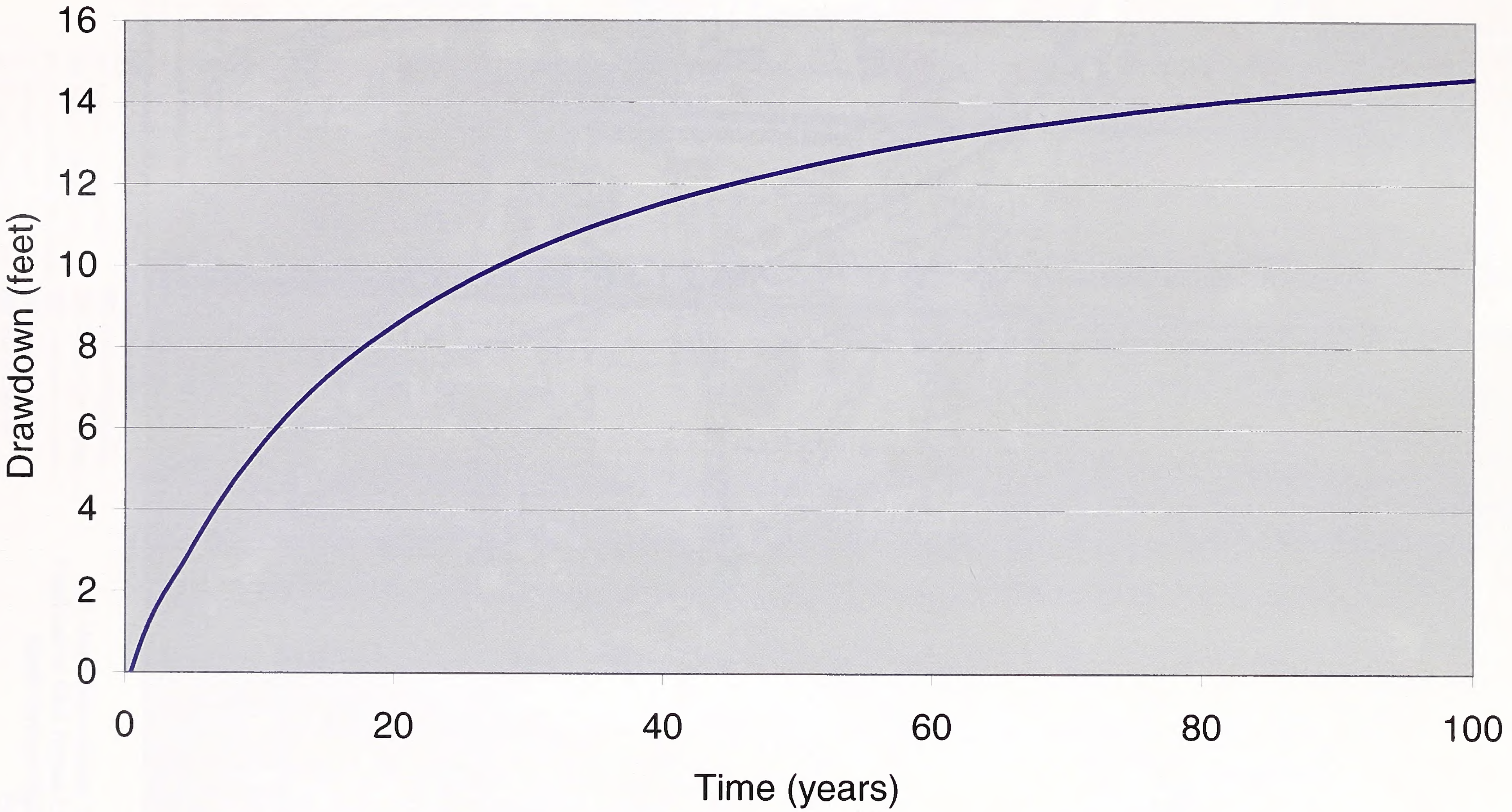
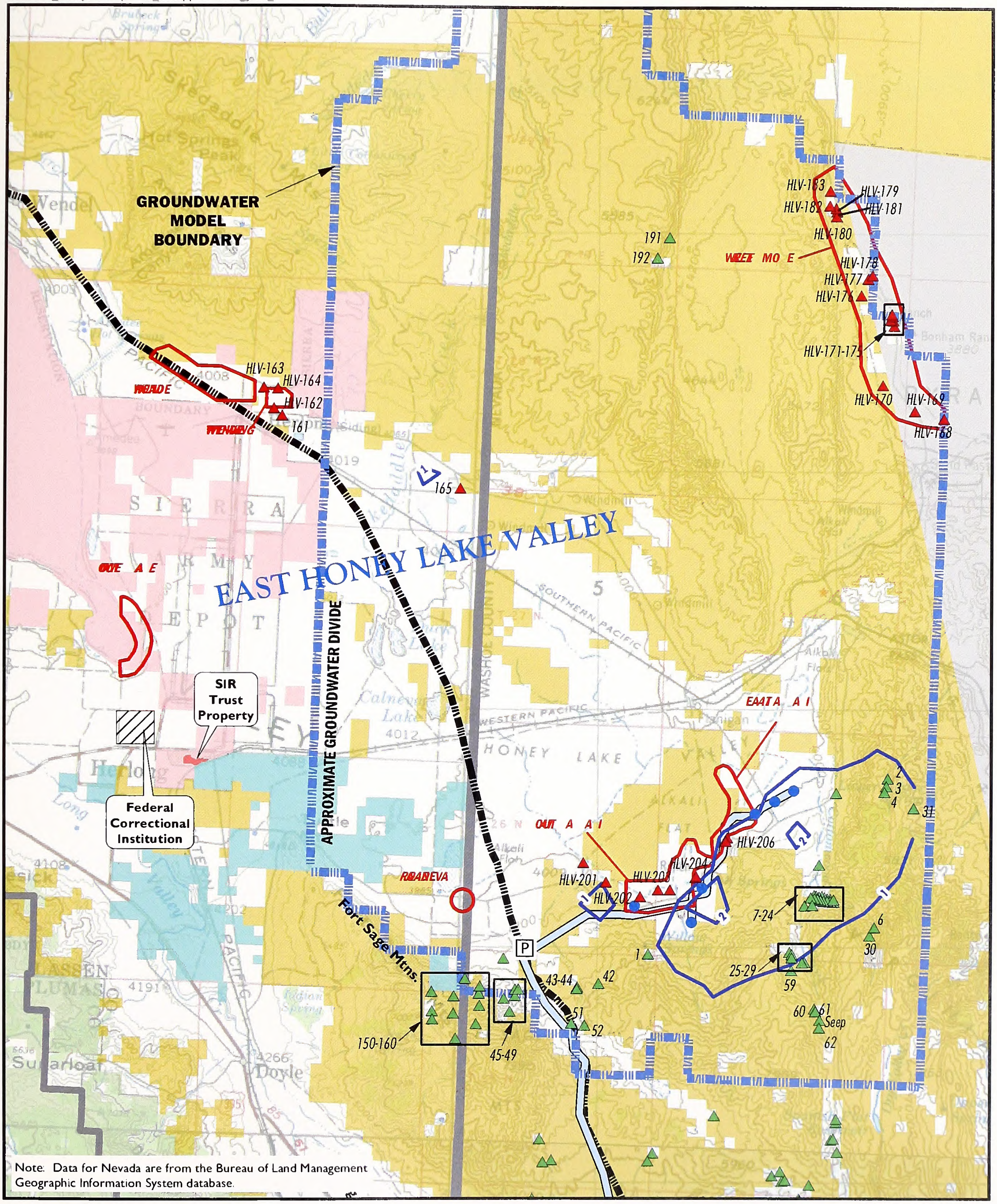


FIGURE C-2
Computed Drawdown vs. Time at Headquarters Well 120
Fish Springs Ranch Area, Eastern Honey Lake Valley



EIS\north_valley\arcmap\draft_eis\appendix\hlv_year_1.mxd



P	Proposed Pump Station
●	Proposed Pumping Wells
	Proposed Pipeline Route
	Tuscarora Natural Gas Pipeline
▲	Spring or Seep > 4100 ft. Elev.
▲	Spring or Seep < 4100 ft. Elev.
5	Contour of Predicted 1-Year Drawdown (feet) In Layer 1 After Pumping 8,000 acre-feet/yr

Public Ownership

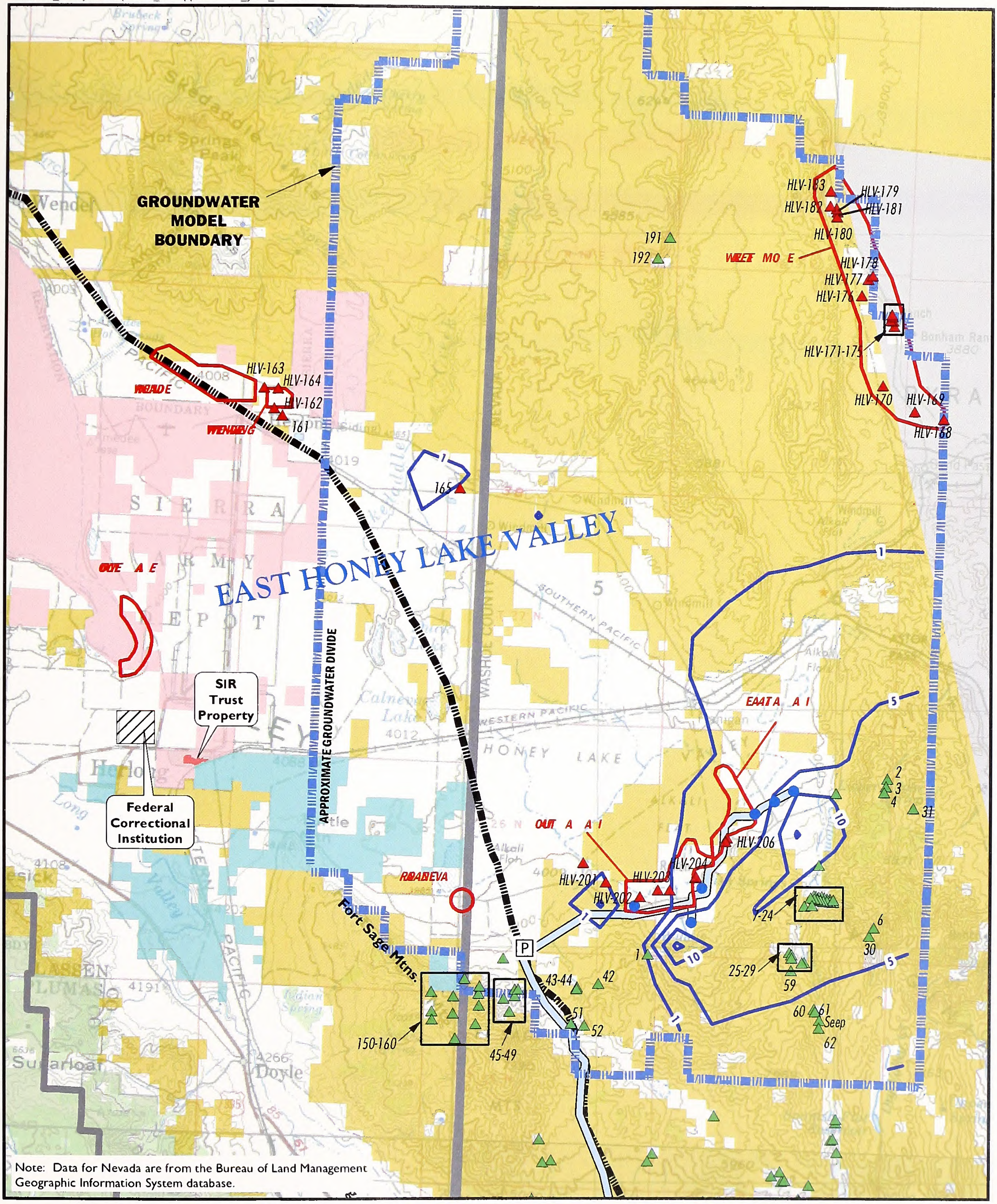
- Bureau of Indian Affairs
- Bureau of Land Management
- Department of Defense
- Forest Service
- State of California
- Susanville Indian Ranchera (SIR)
- Potential Habitat for Carson Wandering Skipper

N

0 Miles 4

1-Year Groundwater Drawdown
Predicted in East Honey Lake Valley
North Valleys Rights-of-Way
Projects EIS
Washoe County, Nevada
FIGURE C-3

EIS\north_valley\arcmap\draft_eis\appendix\hlv_year_10.mxd



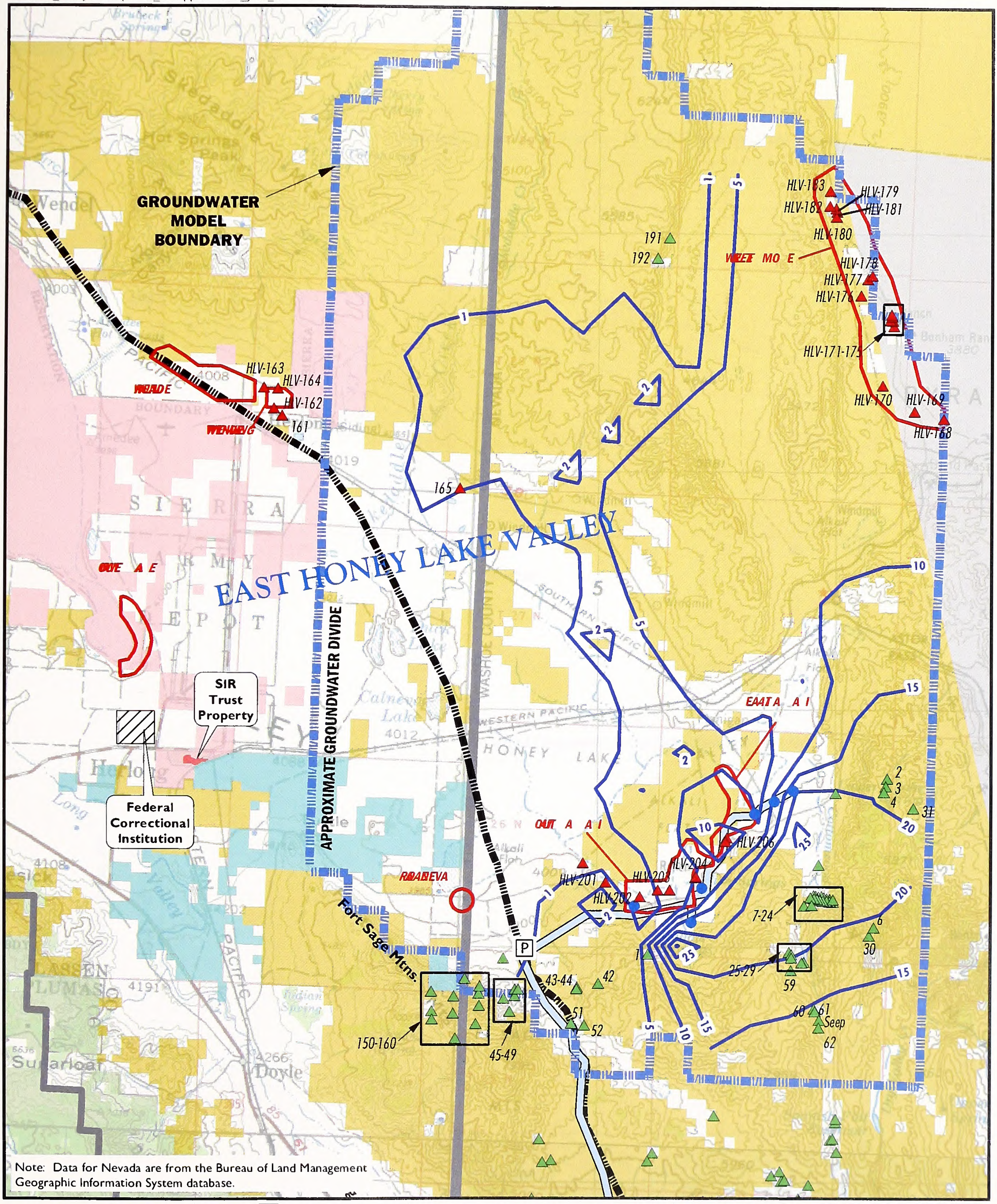
Miles 0 4

- P Proposed Pump Station
- Proposed Pumping Wells
- Proposed Pipeline Route
- Tuscarora Natural Gas Pipeline
- Spring or Seep > 4100 ft. Elev.
- Spring or Seep < 4100 ft. Elev.
- Contour of Predicted 10-Year Drawdown (feet) In Layer 1 After Pumping 8,000 acre-feet/yr
- Potential Habitat for Carson Wandering Skipper

Public Ownership
- Bureau of Indian Affairs
- Bureau of Land Management
- Department of Defense
- Forest Service
- State of California
- Susanville Indian Ranchera (SIR)

10-Year Groundwater Drawdown
Predicted in East Honey Lake Valley
North Valleys Rights-of-Way
Projects EIS
Washoe County, Nevada
FIGURE C-4

EIS\north_valley\arcmap\draft_eis\appendix\hlv_year_100.mxd



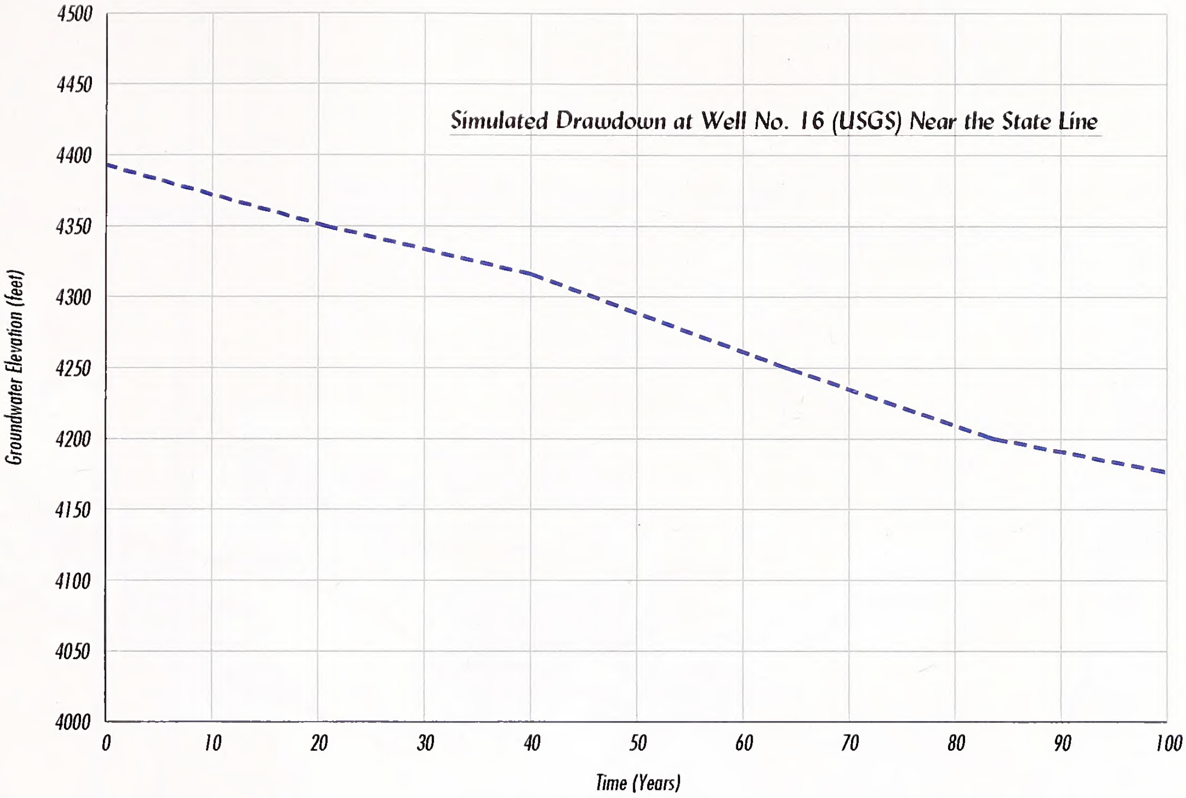
N

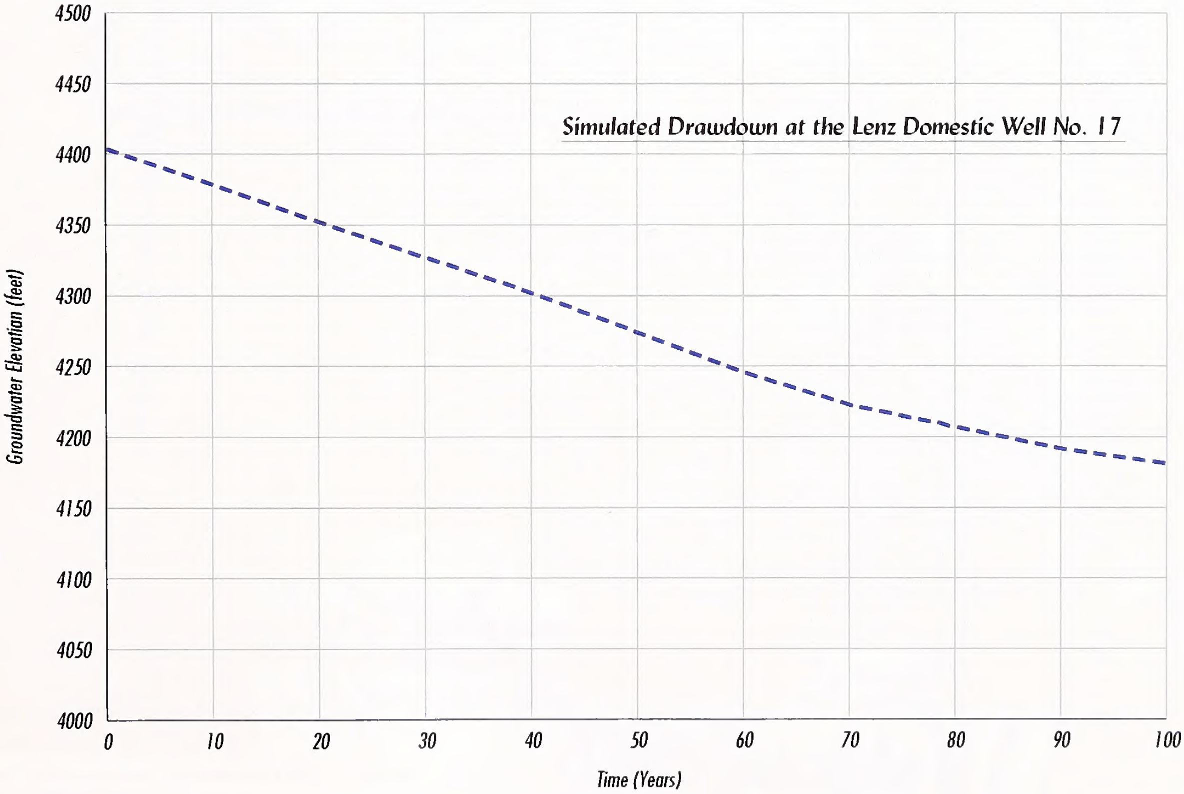
0 Miles 4

- P Proposed Pump Station
- Proposed Pumping Wells
- Proposed Pipeline Route
- Tuscarora Natural Gas Pipeline
- Spring or Seep > 4100 ft. Elev.
- Spring or Seep < 4100 ft. Elev.
- 5 Contour of Predicted 100-Year Drawdown (feet) In Layer 1 After Pumping 8,000 acre-feet/yr

Public Ownership
- Bureau of Indian Affairs
- Bureau of Land Management
- Department of Defense
- Forest Service
- State of California
- Susanville Indian Ranchera (SIR)
- Potential Habitat for Carson Wandering Skipper

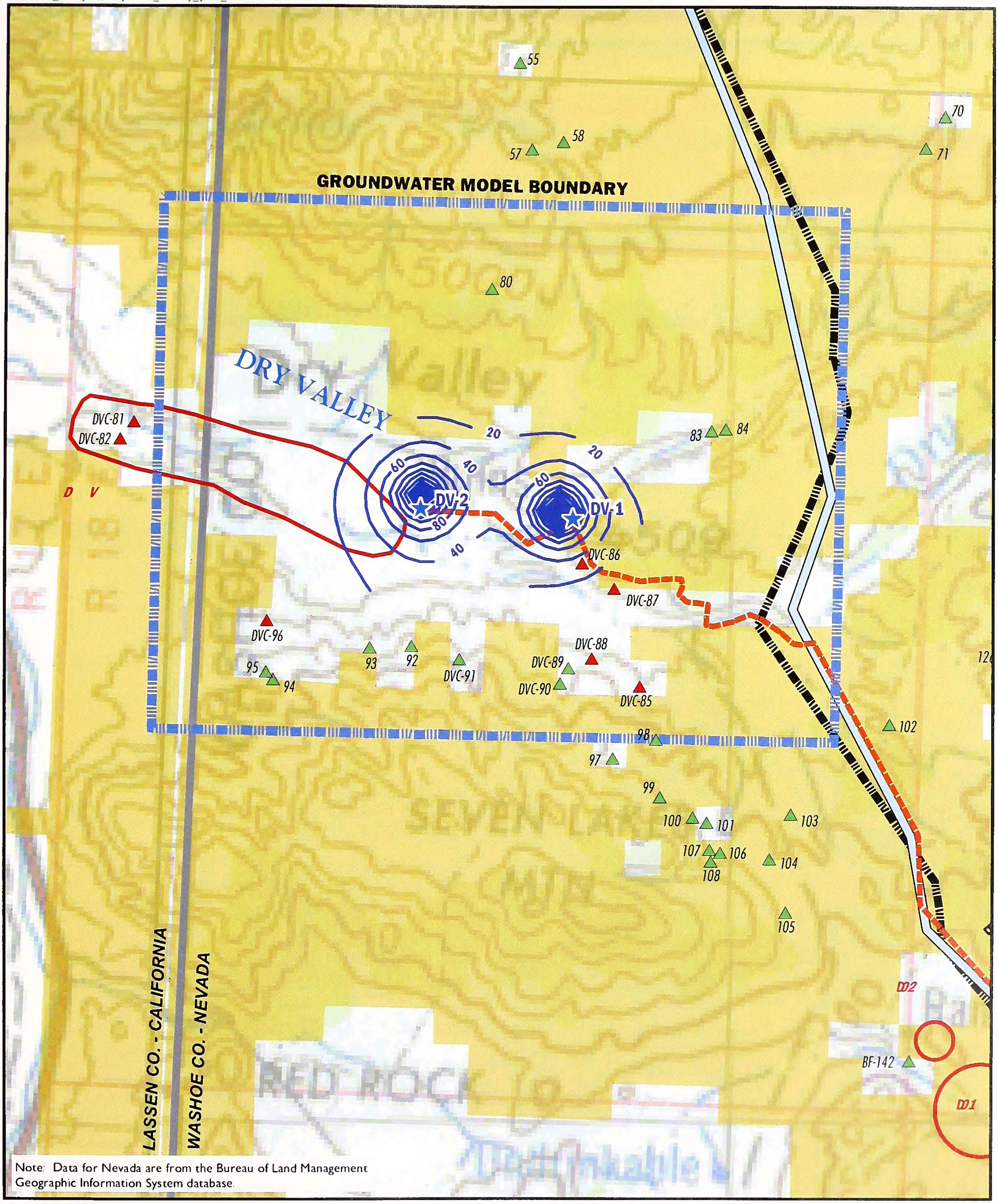
100-Year Groundwater Drawdown
Predicted in East Honey Lake Valley
North Valleys Rights-of-Way
Projects EIS
Washoe County, Nevada
FIGURE C-5





Groundwater Drawdown Over 100 Years
for Two Wells in Dry Valley
North Valleys Rights-of-Way Projects EIS
Reno, Nevada
FIGURE C-6

EIS\north_valley\arcmap\draft_eis\dry_year_1.mxd



P Proposed Pump Station

Proposed Pumping Wells

Proposed Pipeline Route

Proposed Pipeline Route

Tuscarora Natural Gas Pipeline

10 Contour of Predicted 1-Year Drawdown (feet) In Layer 3 After Pumping 3,000 acre-feet/yr

Spring or Seep >4600 ft. Elev.

Spring or Seep <4600 ft. Elev.

Public Ownership

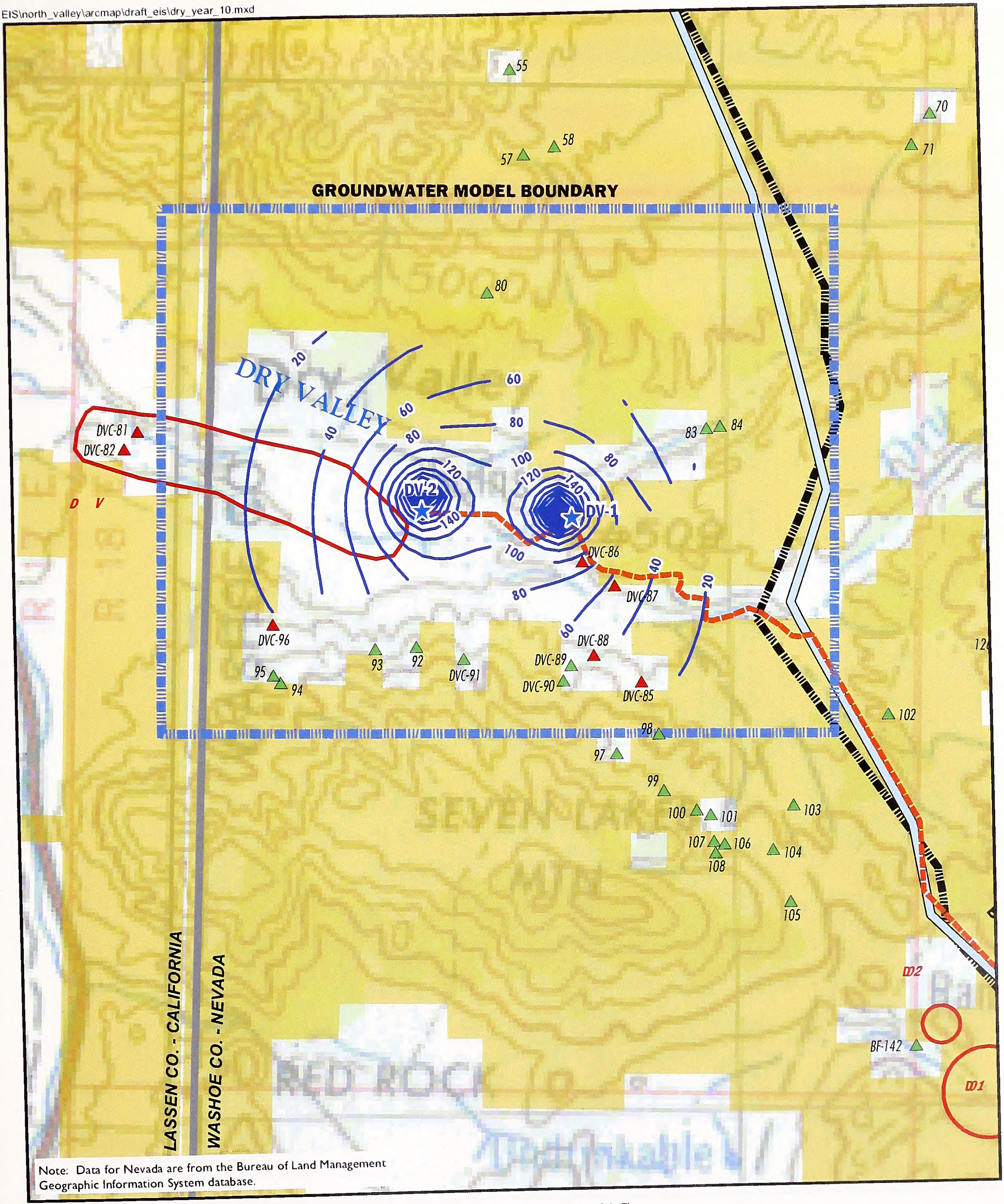
Bureau of Land Management

Potential Habitat for Carson Wandering Skipper

0 Miles 1

1-Year Groundwater Drawdown
Predicted in Dry Valley
North Valleys Rights-of-Way
Projects EIS
Washoe County, Nevada
FIGURE C-7

EIS\north_valley\arcmap\draft_eis\dry_year_10.mxd



Proposed Pump Station

Proposed Pumping Wells

Proposed Pipeline Route

Proposed Pipeline Route

Tuscarora Natural Gas Pipeline

Contour of Predicted 10-Year Drawdown (feet) In Layer 3 After Pumping 3,000 acre-feet/yr

Spring or Seep >4600 ft. Elev.

Spring or Seep <4600 ft. Elev.

Public Ownership

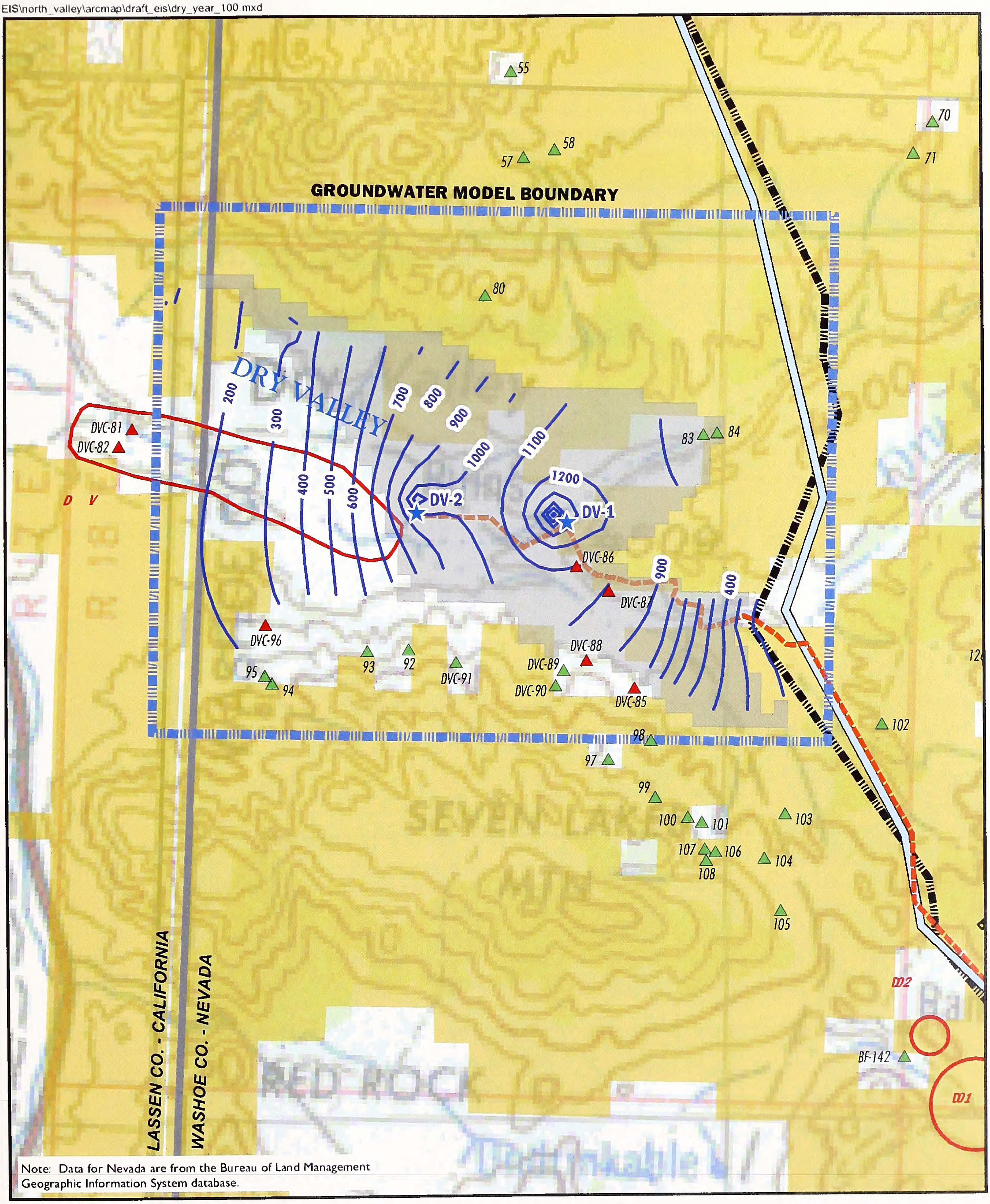
Bureau of Land Management

Potential Habitat for Carson Wandering Skipper

0 Miles 1

10-Year Groundwater Drawdown
Predicted in Dry Valley
North Valleys Rights-of-Way
Projects EIS
Washoe County, Nevada
FIGURE C-8

EIS\north_valley\arcmap\draft_eis\dry_year_100.mxd



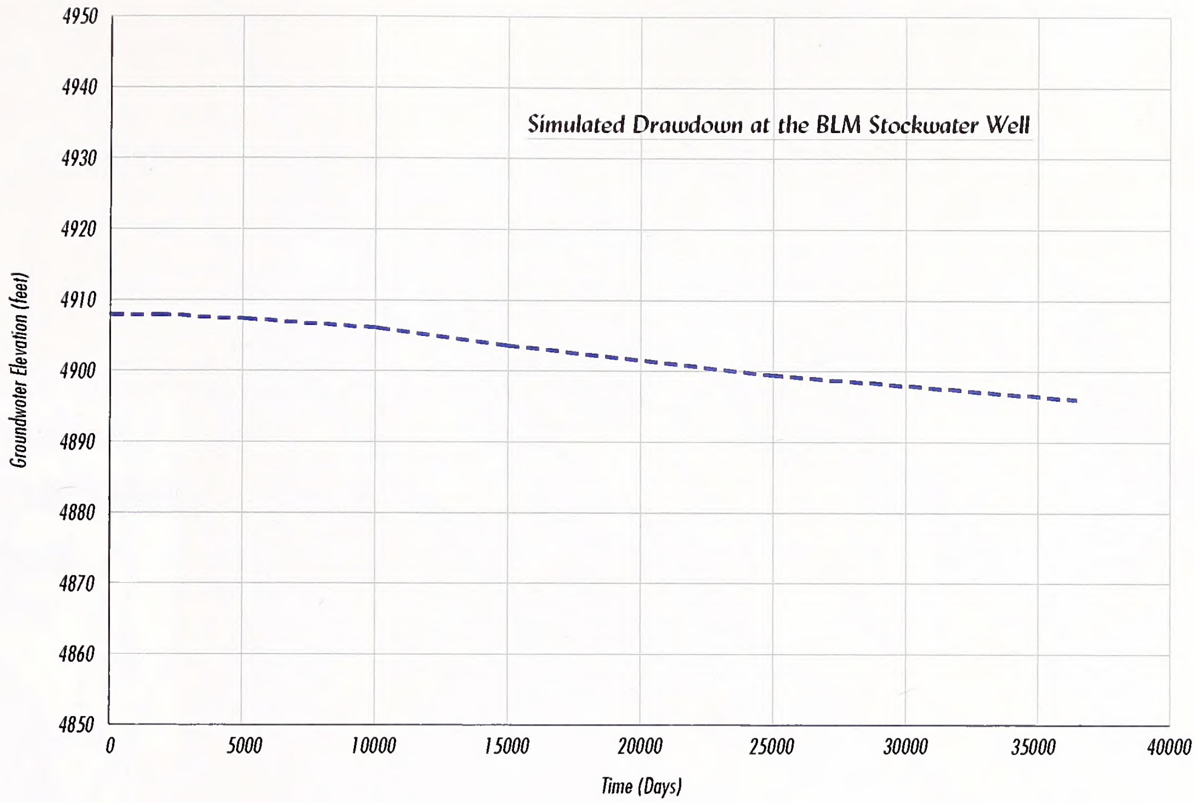
0 Miles 1

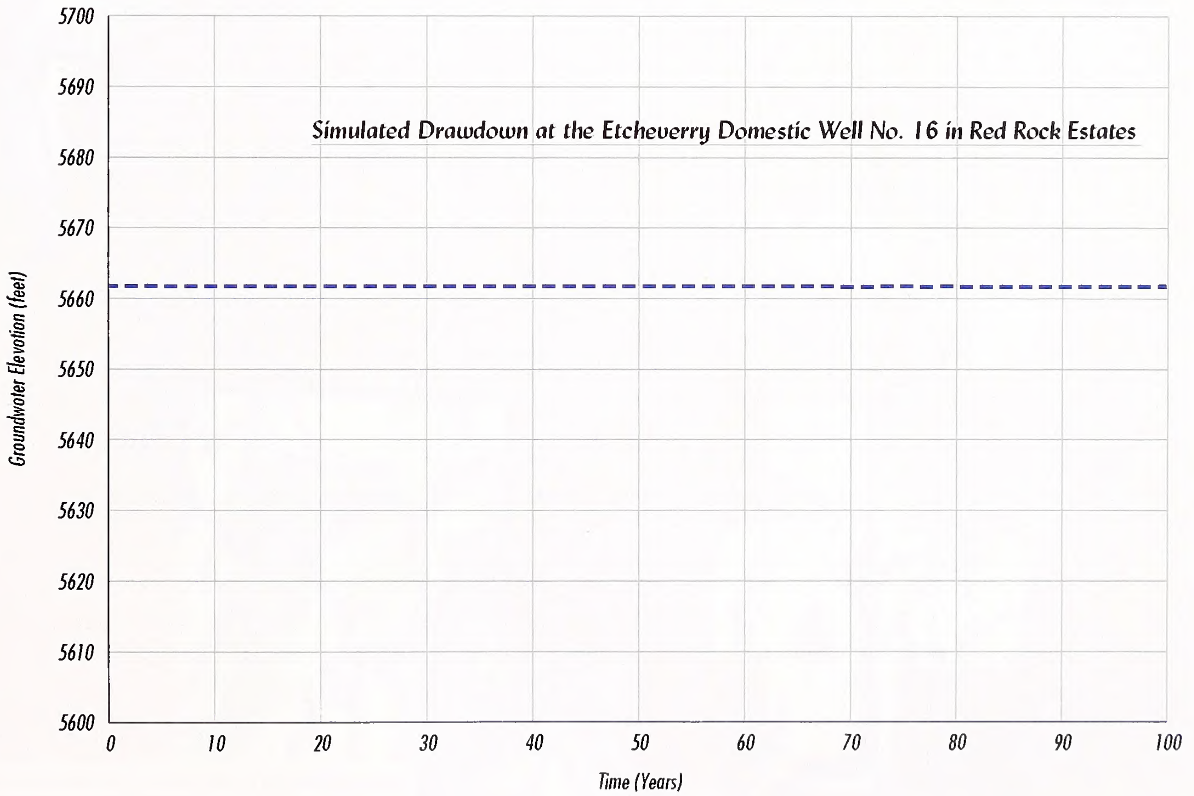
- P Proposed Pump Station
- Proposed Pumping Wells
- Proposed Pipeline Route
- Proposed Pipeline Route
- Tuscarora Natural Gas Pipeline
- Contour of Predicted 100-Year Drawdown (feet) In Layer 3 After Pumping 3,000 acre-feet/yr
- Spring or Seep >4600 ft. Elev.
- Spring or Seep <4600 ft. Elev.

Public Ownership

- Bureau of Land Management
- Potential Habitat for Carson Wandering Skipper
- Area of Complete Aquifer Dewatering In Layer 3

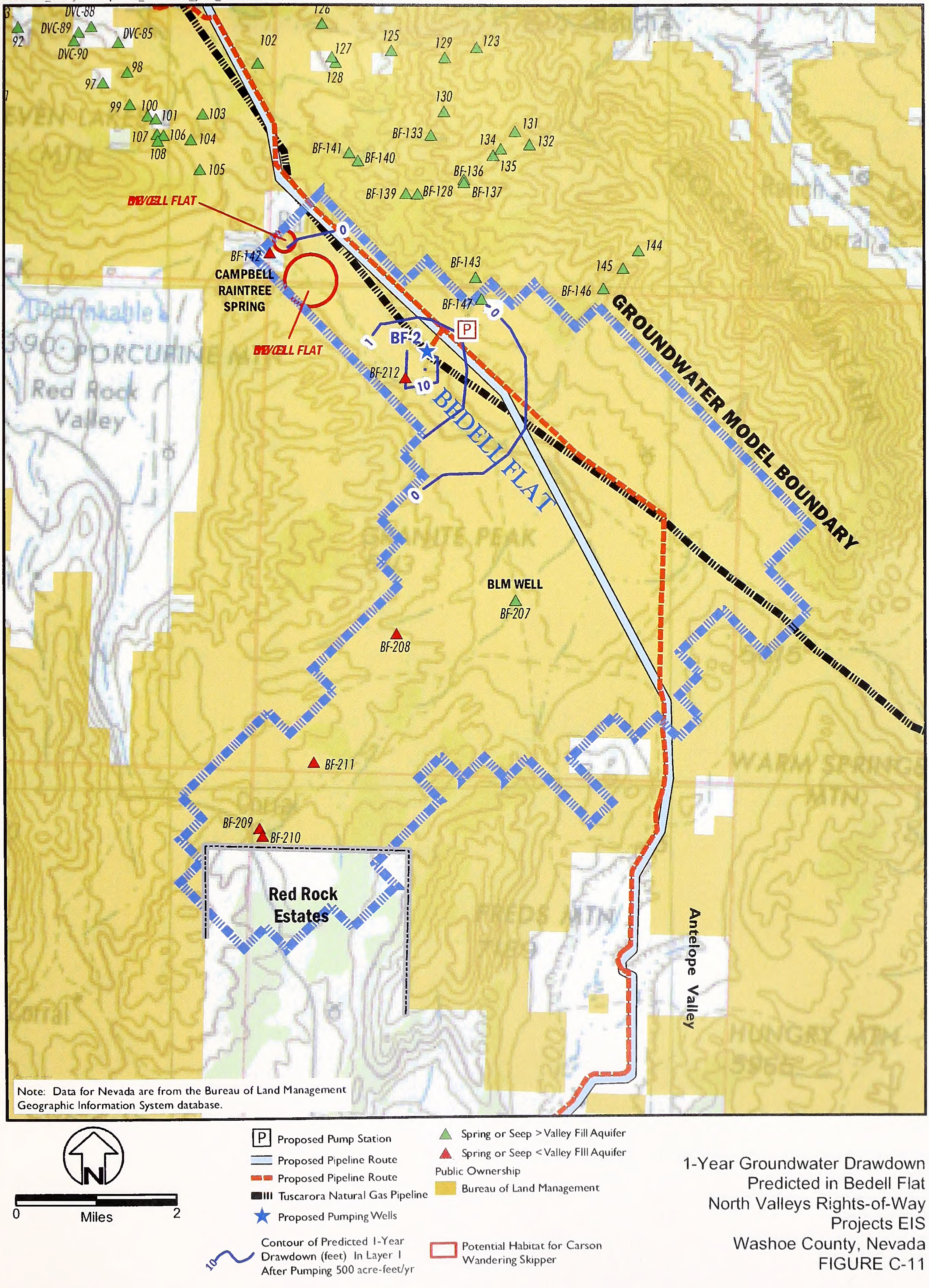
100-Year Groundwater Drawdown
Predicted in Dry Valley
North Valleys Rights-of-Way
Projects EIS
Washoe County, Nevada
FIGURE C-9





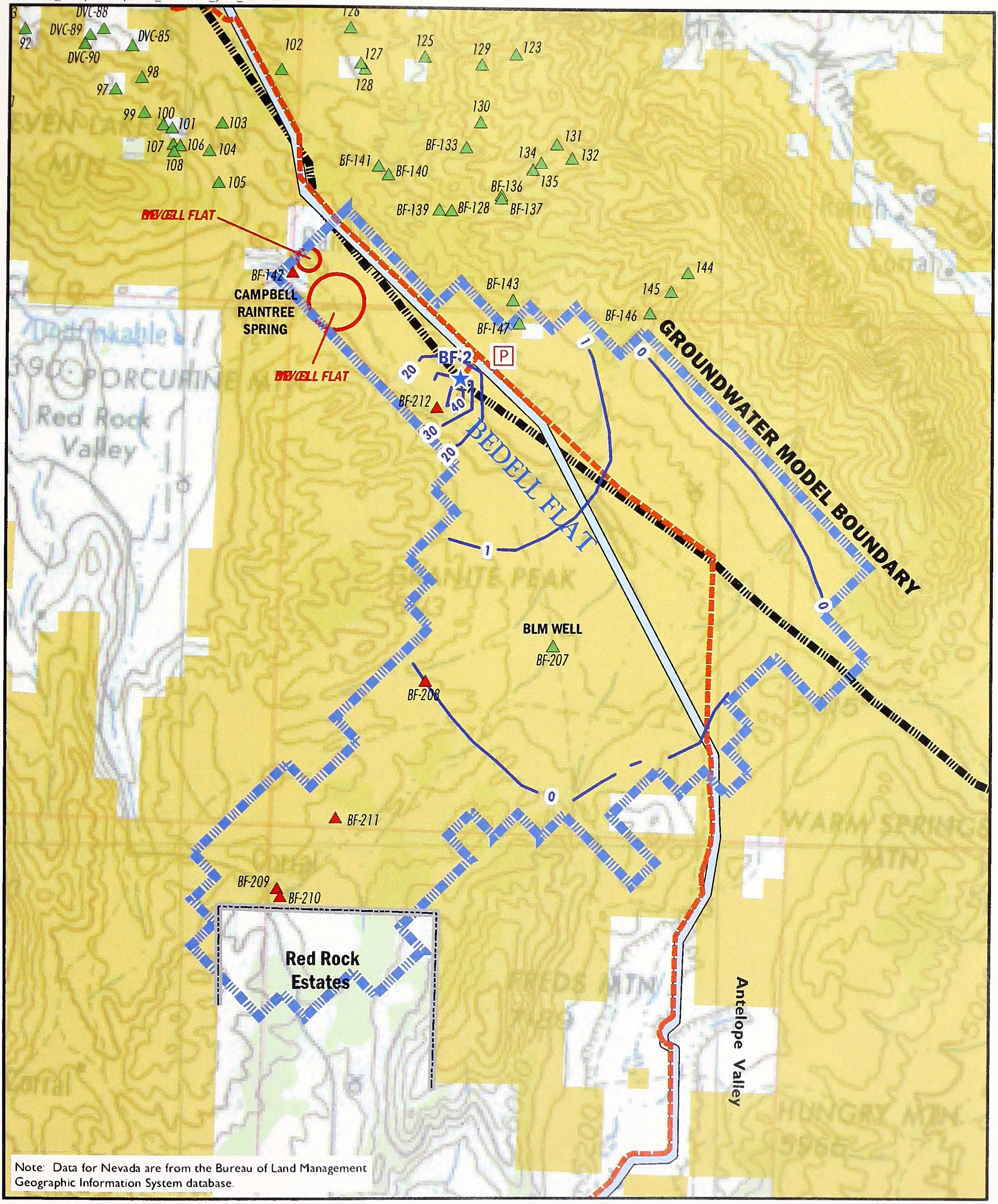
Groundwater Drawdown Over 100 Years
for Two Wells in Bedell Flat
North Valleys Rights-of-Way Projects EIS
Reno, Nevada
FIGURE C-10

EIS\north_valley\arcmap\draft_eis\bedell_year_1.mxd



1-Year Groundwater Drawdown
Predicted in Bedell Flat
North Valleys Rights-of-Way
Projects EIS
Washoe County, Nevada
FIGURE C-11

EIS\north_valley\arcmap\draft_eis\bedell_year_10.mxd



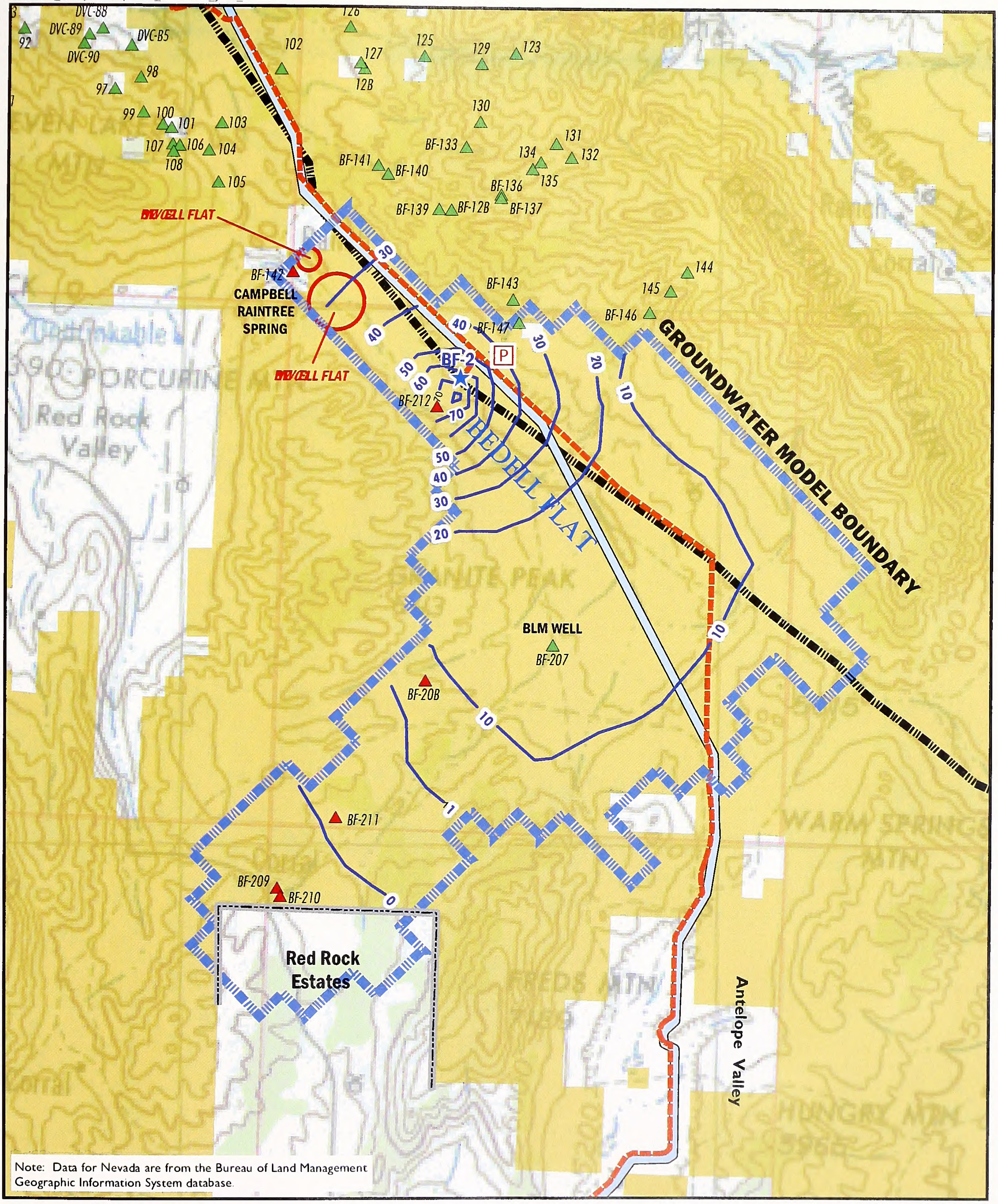
0 Miles 2

P Proposed Pump Station
Proposed Pipeline Route
Proposed Pipeline Route
Tuscarora Natural Gas Pipeline
Proposed Pumping Wells
Contour of Predicted 10-Year Drawdown (feet) In Layer 1 After Pumping 500 acre-feet/yr

Spring or Seep > Valley Fill Aquifer
Spring or Seep < Valley Fill Aquifer
Public Ownership
Bureau of Land Management
Potential Habitat for Carson Wandering Skipper

10-Year Groundwater Drawdown
Predicted in Bedell Flat
North Valleys Rights-of-Way
Projects EIS
Washoe County, Nevada
FIGURE C-12

EIS\north_valley\arcmap\draft_eis\bedell_year_100.mxd



0 Miles 2

- Proposed Pump Station
- Proposed Pipeline Route
- Proposed Pipeline Route
- Tuscarora Natural Gas Pipeline
- Proposed Pumping Wells
- Contour of Predicted 100-Year Drawdown (feet) In Layer 1 After Pumping 500 acre-feet/yr
- Spring or Seep > Valley Fill Aquifer
- Spring or Seep < Valley Fill Aquifer
- Public Ownership
- Bureau of Land Management
- Potential Habitat for Carson Wandering Skipper

100-Year Groundwater Drawdown
Predicted in Bedell Flat
North Valleys Rights-of-Way
Projects EIS
Washoe County, Nevada
FIGURE C-13